

March 1942

TECHNOLOGY REVIEW

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ORDERS

are not our only backlog

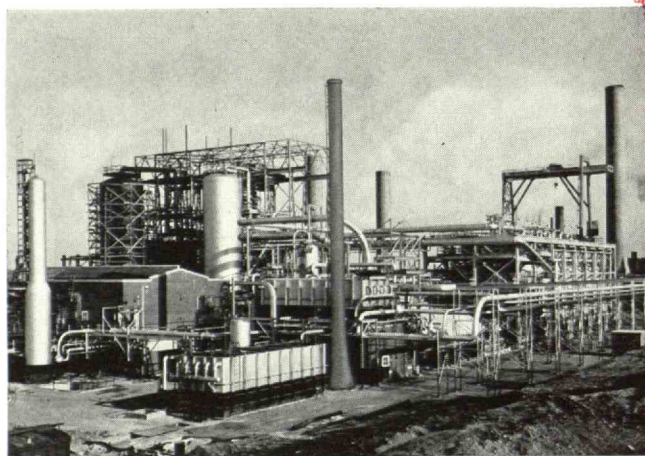
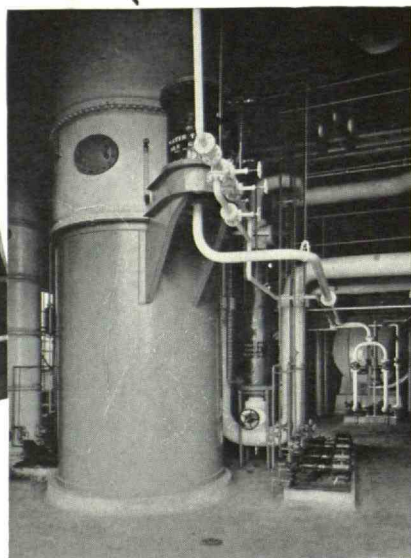
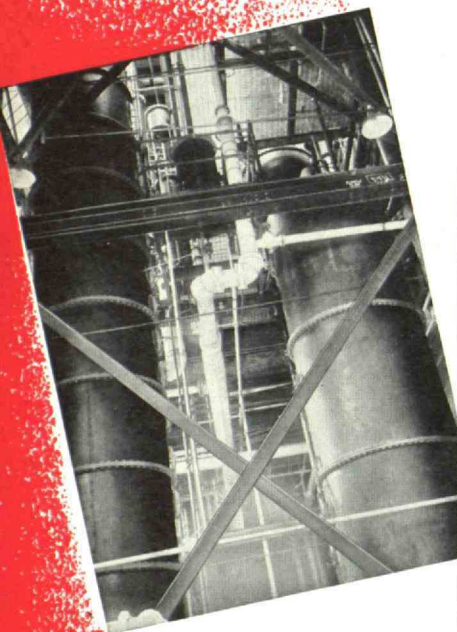
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on hand at any time
and are constantly
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As the world has come to realize, modern wars are won in factories. The men who turn out defense material are as important as the men who use it. It is a blow to National Defense when a worker is taken "off duty" because of an eye accident—tragically proven by the fact that *eye accidents alone* have kept hundreds of bombers from reaching the sky and battleships from strengthening the fleet.

Keep American workers on the job . . . keep their machines running . . . keep their production flowing—

with American Goggles. The American Line is the front line of defense for eyes and costs. It is *complete*—offering safe, cool, comfortable protection for every kind of work and from every type of eye accident. American deep-curved Super Armorplate Lenses, which can be ground to the individual prescription of all whose vision is defective, provide greater resistance to impact.

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American Optical Company

Southbridge, Massachusetts

MANUFACTURERS, FOR MORE THAN 100 YEARS, OF PRODUCTS TO AID AND PROTECT VISION

THE TECHNOLOGY REVIEW, March, 1942. Vol. XLIV, No. 5. Published monthly from November to July inclusive at 10 Ferry Street, Concord, N. H. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription \$3.50; Canadian and Foreign subscription \$4.00. Entered as second-class matter at the Post Office at Concord, N. H., under the Act of March 3, 1879.

Return of the Carbon Age

CARBON . . . one of Nature's oldest and most plentiful materials . . . is making possible some of industry's newest achievements.

In the *chemical* industry, massive black towers of carbon . . . erected in incredibly short periods of time . . . speed the delivery of vital acids. The all-carbon electrostatic precipitator . . . built of carbon from the bottom to the top of the stack . . . is now an actuality. Such towers can be erected in as little as a *week's time*! Staunchly immune to corrosion and thermal shock, they should last *indefinitely*.



Today . . . due to basic and applied research into the properties of carbon and graphite . . . it is possible to obtain these black, wonder-working materials in such a variety of forms—blocks, bricks, beams, tubes, pipes, and fittings . . . even valves and pumps . . . that almost any size or shape of structure can be built from them. For making tight joints, which give the structure uniform properties throughout, special carbon- and graphite-base cements have been developed.



Undisturbed by the torture of heat, carbon is also a "must" in the *metallurgical* industry. Carbon *cannot be melted* . . . will not soften . . . and has remarkable dimensional stability even at incandescent heat. In addition, it will not flake off and hot metal will not stick to it. That is why it is ideal for such uses as molds, cores, and plugs . . . for the lining of furnaces . . . and for sampling-dippers.




Because electric-furnace graphite conducts heat even *better than most metals*, it is becoming increasingly important in the manufacture of heat exchangers for the processing of corrosive liquids and gases.

These new uses for carbon and graphite . . . added to the almost interminable list of uses that existed before . . . make this era truly a carbon age. Your inquiries are cordially invited.

The strides made in the development of structural carbon, and in the uses of other carbon and graphite products, are greatly facilitated by the technical assistance of other Units of Union Carbide and Carbon Corporation including The Linde Air Products Company, Carbide and Carbon Chemicals Corporation, Electro Metallurgical Company, Haynes Stellite Company, and Union Carbide and Carbon Research Laboratories, Inc. — all of which collaborate with National Carbon Company in research into the properties and applications of carbon and graphite.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation
30 East 42nd Street  New York, N. Y.

This all-carbon electrostatic precipitator stands 55 feet, 2 inches high.

**STEAM Heats
America**

How the comfort and economy of modern steam heating can be extended to educational institutions through Webster Heating Modernization Programs is shown in the fact stories below. See how the Webster Moderator System saves fuel, increases the effective capacity of existing heating plants and improves heating service. A nation-wide organization of steam heating specialists helps to insure the effectiveness of Webster Systems of Steam Heating.

WARREN WEBSTER & COMPANY, Camden, New Jersey
Pioneers of the Vacuum System of Steam Heating : : Est. 1888
Representatives in 65 principal U. S. Cities

VILLANOVA COLLEGE SOLVES PROBLEM OF HEAT DISTRIBUTION

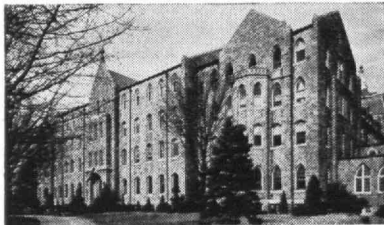
**Webster Moderator System Makes
Possible 25-30% Reduction in
Annual Steam Consumption**

CUTS COSTLY WINDOW OPENING

**Steam Delivery to Radiators is
Adjusted Automatically by
Outdoor Thermostats**

Villanova, Pa.—Villanova College, one of America's leading Catholic educational institutions, solved the heating problem in three College buildings by installing Webster Moderator Systems in 1940.

The buildings are Mendel Hall, including a dormitory, classrooms and administrative offices; Fedigan Hall and Alumni Hall, both dormitories.



Mendel Hall, Villanova College, Villanova, Pa.

"We are satisfied that we have found the ideal method of heat control for school or college buildings," says John Lawson, Controller. "We are getting exactly the temperatures we want at a saving of 25 to 30 per cent in steam consumption."

"We are particularly pleased with the control of steam delivery by the Webster Outdoor Thermostat feature of the Moderator System. This makes the heating of each of our buildings independent of window opening, saves steam."

The Superintendent of Buildings and Grounds is responsible for the well-planned operating schedule which assures maximum comfort from the Webster Systems.

Galligan Brothers, of Philadelphia, acted as modernization heating contractors.

The heating of two more Villanova College buildings was brought up-to-date in 1941 with Webster Moderator Systems.

UNIVERSITY SOLVES HEATING PROBLEM IN NEW BUILDING

**Northeastern "U" Meets Varied
Heating Needs by Installing
Webster Moderator System**

MINIMUM STEAM CONSUMPTION

**College of Engineering Located
in new Richards Hall Operates
on the Cooperative Plan**

Boston, Mass.—The beautiful new Richards Hall erected in 1938 on the campus of Northeastern University presented a problem in heat distribution that was solved by the installation of a Webster Moderator System of Steam Heating.

Richards Hall is used for a wide variety of purposes—administrative offices, lecture halls, classrooms, laboratories, recreation rooms, machine shops, lunch room and chapel. The Webster Moderator System provides the proper temperature in each room and in each section of the building with minimum steam consumption.



Richards Hall, Northeastern University,
Boston, Mass.

A Webster Outdoor Thermostat automatically adjusts the basic rate of steam delivery with every change in outdoor conditions.

Among other schools located in Richards Hall is Northeastern University's famed College of Engineering, the students of which alternate regular periods of classroom instruction with supervised employment in industry. Three hundred industrial concerns cooperate with the University in making this program effective.

V. J. Kenneally Co., of Boston, served as the heating contractor. There is a total of 32,354 square feet of installed direct radiation.

Richards Hall was designed by Coolidge, Shipley, Bulfinch and Abbott, well-known Boston architects. Charles T. Main, Inc., served as Consulting Engineers.

SOLVES PROBLEM OF DISTRIBUTING HEAT TO 1300 RADIATORS

**Webster Moderator System Used
In Famous Perkins Institution
& Mass. School for Blind**

WIDELY SEPARATED BUILDINGS

**Provides Comfort in Every Room
and thus Reduces Wasteful and
Unnecessary Window Opening**

Watertown, Mass.—The problem of distributing heat evenly and rapidly to approximately 1,300 radiators in the widely separated buildings of the Perkins Institution & Massachusetts School for the Blind was solved in 1937 as the result of a Webster Heating Modernization Program.

Before modernization, some sections of this well-known institution were hard to keep warm while other sections were frequently overheated.



Perkins Institution & Massachusetts School
for the Blind, Watertown, Mass.

The Webster Moderator System corrected the steam distribution weaknesses of the existing installation by means of Webster Metering Orifices in branch mains and radiator supply valves. All radiators now receive steam at the same time and exactly in proportion to need.

The four-zone central Control Cabinet of the Webster Type EH Moderator System enables the operator to meet the special heating needs of each section of the Perkins Institution & Massachusetts School for the Blind. Steam can be shut off in any section not in use, whether it is classrooms, offices or dormitories.

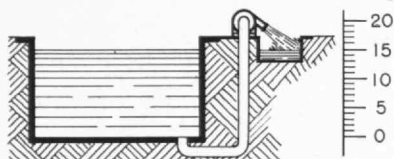
The elimination of overheating reduces wasteful window opening to the minimum.

The Cleghorn Company, of Boston, Mass., acted as modernization heating contractors.

H. F. MARSHALL '19

Just for Fun! A CHALLENGE TO YOUR INGENUITY

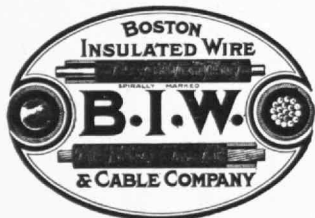
A CONSTANT speed centrifugal pump is to draw water out of a tank and discharge it into a ditch, as shown. (1) Will the drive motor be safe, if designed to handle the maximum (empty tank) lift of 20 feet? (2) Specify another design factor that should be checked.



Answers: (1) Power requirements of many centrifugal pumps increase with *decreased* lift: greatest rates of pumping may be expected when the tank is full. (2) Priming equipment should be provided, unless the pump can be lowered.

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signed for particular applications on instruments and
apparatus

**BOSTON INSULATED
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BOSTON, MASSACHUSETTS**

THE TABULAR VIEW

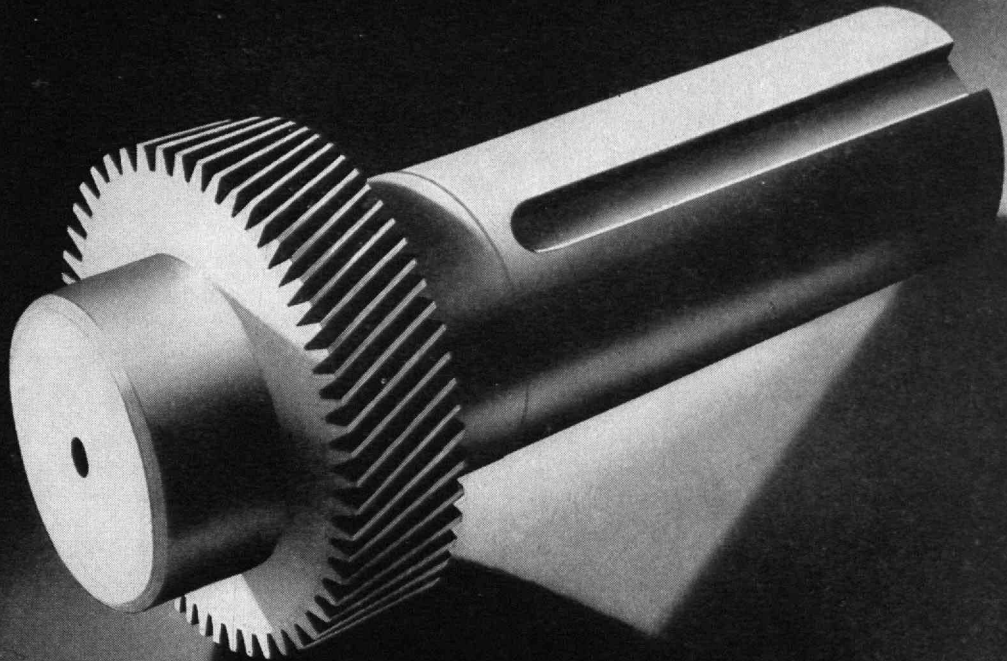
Matter and Mars. — In a world interconnected by technology, war necessarily means many maladjustments and dislocations even exceeding in their social and economic consequences the worst penalties which Ares exacted in earlier times. From the point of view of chemical industry, many evidences of this fact are to be discerned. AVERY A. MORTON, '24, Professor of Organic Chemistry and Director of the Research Laboratory of Organic Chemistry at the Institute, recently discussed several examples before the Alumni Council in a penetrating address from which his provocative article (page 216) is drawn. Another aspect of the relation between chemistry and our world is discussed by Professor Morton's colleague, AVERY A. ASHDOWN, '24, Associate Professor of Organic Chemistry, who reviews (page 215) a recent popular treatment of the subject.

Swift. — History is made at a fast pace in our times, in no small measure because of the acceleration of activities which the airplane has made possible. Naturally, then, the history of aviation itself, slender in point of years, should be extensive in point of content and complication. Few writers are more aware of this paradox than S. PAUL JOHNSTON, '21, frequent contributor to The Review on matters aeronautical. In this issue (page 218) Mr. Johnston tells the story of a pioneer in flight — a story interesting in its depiction of a sincere and courageous man and informative in its presentation of notes on the background of a major industry. Formerly co-ordinator of research for the National Advisory Committee for Aeronautics, Mr. Johnston is now with the Curtiss-Wright Corporation.

Food Framework. — Special demands not only on diet itself but also on the distribution of the materials of the dietary are imposed by wartime necessities. The planning and providing of proper food to meet emergency needs, and the establishment of a system of distribution and allocation calculated to give all parts of the population its requisites have been worked out effectively in Britain, as is pointed out (page 221) by ROBERT S. HARRIS, '28, Associate Professor of Biochemistry of Nutrition at Technology. Professor Harris' food researches for American antarctic expeditions are familiar to readers of The Review. At present his studies are concerned with wartime needs.

Deep Holes. — The drilling crews operating in American oil fields bid fair in many ways to become a focus of legend akin to that which clusters around the lumberjacks and rivermen of an earlier day. With what they do what they do is described in this issue (page 224) by GILBERT W. NOBLE, '25, Associate Professor of Petroleum Engineering at the Missouri School of Mines. Dr. Noble writes from firsthand knowledge and appreciation of his subject.

Chrome-moly steels speed production and lower costs



A manufacturer of speed reduction gear pinions is taking advantage of two of the outstanding advantages of Chromium-Molybdenum (4140) steel — uniform hardening in heavy section, and excellent machinability at intermediate hardnesses.

Pinion and shaft are machined integral from a 4140 round oil quenched and tempered to about 150,000 p.s.i. tensile and 300 B.H.N.

Uniformity in hardness of the heat treated bar assures adequate strength in the shaft even though its diameter is only about half that of the pinion. This integral construction eliminates an assembly operation and makes for better performance.

Our booklet, "Molybdenum in Steel," contains helpful data on Molybdenum steels. It will be sent without charge to interested students and graduates.

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MAIL RETURNS

Automobile History

FROM FRANCIS A. ROULEAU, S. J., TO LEROY L. THWING, '03:

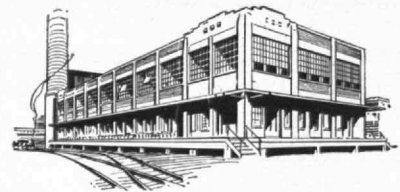
This is a letter that, by the most elementary requisite of gratitude, should have been written last May or June. It was in May, in fact, that I first received your article, "Automobile Ancestry," from The Review of February, 1939, along with your letter referring to source data on Verbiest, as well as a third enclosure containing translation of the chapter on pneumatics from Verbiest's original *Astronomia Europaea*. . . .

It was a great pleasure for me, as well as for the director of the Bureau Sinologique (a French Father), to receive this communication from you; and speaking for the both of us, we wish to extend to you our most genuine thanks for this thoughtfulness and for the trouble you have had to go through in forwarding this interesting matter to us. . . .

It goes without saying that all of us here were immensely interested in your fine, sympathetic description of Verbiest's experiment with the "steam wagon" — myself, perhaps, more than anyone (except the director, who is an enthusiastic specialist in the old Jesuit scientists at the Imperial Court). I have been for some time doing special work on Verbiest, and hence it is always a joy for me to come across anything written about him, particularly if it is written in English. So little has been done, apparently, in that language about the men who brought Western sciences to China in the Sixteenth and Seventeenth centuries. On this same subject the French, on the contrary, have a wealth of literature. . . .

About Verbiest's automobile experiment: Henri Bosmans, S. J., a Belgian specialist in Verbiest, treats of the matter in his scholarly *Ferdinand Verbiest, Directeur de l'Observatoire de Pékin*. You will like to know, I feel sure, that Bosmans puts the construction of this steam wagon a little later than you do in your article, that is, around 1678 instead of 1665. The argument for the year 1665 — I am simply following Bosmans — is based on the supposition that the *Astronomia* (printed in 1687) is a reprint of an earlier work published in 1668; and since Verbiest begins the chapter in question by stating that "three years ago" he constructed his machine, the year 1665 would be the date of the invention. It seems, however, that only one chapter of the *Astronomia* is a reprint (the fact is explicitly stated at the beginning of that chapter); the rest of the book, including our "automobile" description, is new matter. Bosmans arrives at his date in this manner: Father Couplet, one of the Peking scientists, left for Europe on business of the mission in 1681. He was something of a "press agent" for Verbiest; to him Verbiest (*Concluded on page 246*)

**Speed with
Economy**



U. S. Industrial Alcohol Company

Any company engaged in defense work has a job that calls for all-out effort.

If your commitments require an additional building, it will pay you to engage a builder experienced in defense construction.

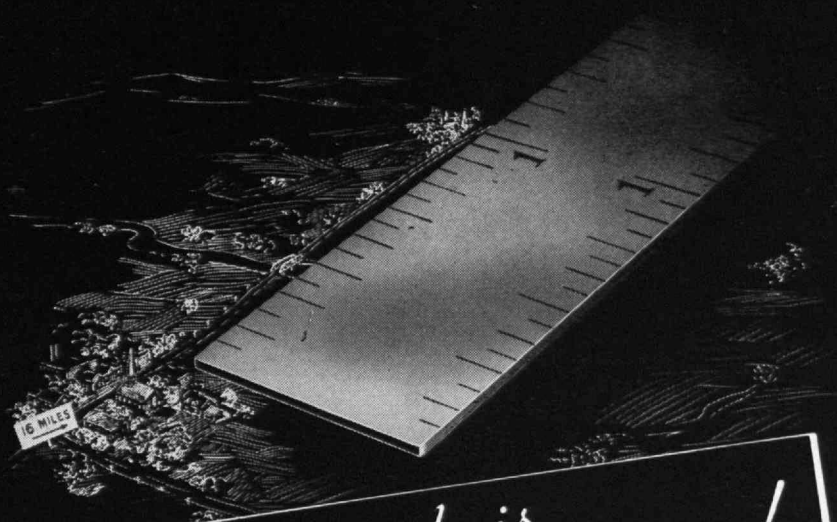
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INDUSTRIAL CONSTRUCTION

Alfred T. Glassett, '20, Vice President

NORTON ABRASIVES



*When one inch is
Sixteen Miles Long!*

Today, quality and refinements in products of all kinds are uppermost in the minds of engineers. Practical instruments are measuring surfaces in terms of microinches.

Just what is a millionth of an inch? Magnify a millionth part of an inch up to one inch, and using the same rate of magnification an inch would be sixteen miles long.

The introduction of new alloys with new standards of precision to shoot at is keeping research engineers constantly on their toes. The near-perfect surfaces are produced with abrasives—processes of grinding, lapping, and superfinishing are results of exhaustive research. Through their endless research, Norton research scientists are bringing abrasive finishing processes nearer and nearer to absolute mechanical perfection.

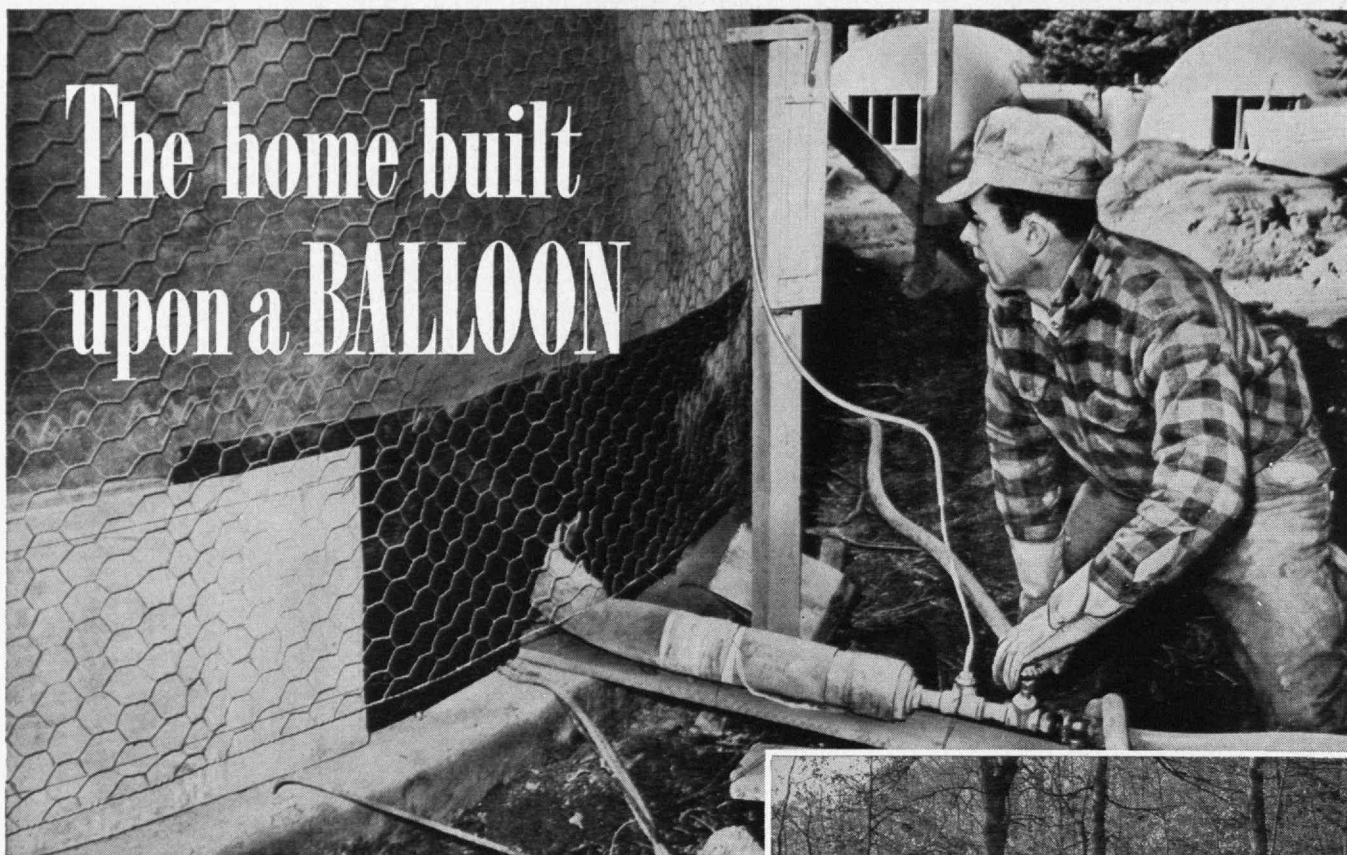
NORTON COMPANY, Worcester, Mass.

BEHR-MANNING DIVISION, TROY, N. Y.—Abrasive Paper and Cloth

WHEN IT'S AN ABRASIVE PROBLEM, CALL IN NORTON ENGINEERING



The home built upon a BALLOON



—a revolutionary use of Goodyear
rubber speeds defense housing



Four-room home, built by "balloon" process, containing living room, two bedrooms, kitchen and bath

HERE you see an utterly new type of home construction, so rapid and inexpensive it promises a new era of expansion in American housing. It is a house literally built upon a balloon—an inflated rubber mold over which concrete is shot to form a fire-proof, termite-proof, earthquake-proof dwelling that ought to last for centuries.

A Los Angeles architect had the idea, but everyone said

it couldn't be done — until he met the G.T.M. — Goodyear Technical Man. After studying the job the G.T.M. produced a semi-spherical balloon built of heavy two-ply rubberized tire fabric. To build, the balloon is laced down to a concrete foundation, inflated, covered with wire mesh and coated with "GUNITE" — liquid concrete sprayed on with a hose.

In twenty-four hours the concrete has set. The balloon is deflated and removed in five minutes — concrete doesn't adhere to rubber. Insulation and another layer of "GUNITE" are applied to the shell, making a per-

manent wall four inches thick. By repeating this process, a snug, warm and weather-tight home of four or more rooms can be quickly built.

So successful is this new construction, it is being considered for bomb shelters, powder magazines, cantonments, farm buildings and hangars as well as low-cost homes, as fast as Goodyear can design balloons of proper shape. Thus another new use of rubber can be credited to the ingenuity of Goodyear in working out a tough assignment. But handling concrete with rubber was no novelty to Goodyear, for long ago we developed a tough, abrasion-resisting hose for spraying concrete — the same type of hose used in building these "balloon" houses.

Let the G.T.M. help you
speed production—with rubber

The Goodyear Technical Man is an expert in all industrial applications of rubber. To consult him, write Goodyear, Akron, Ohio or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

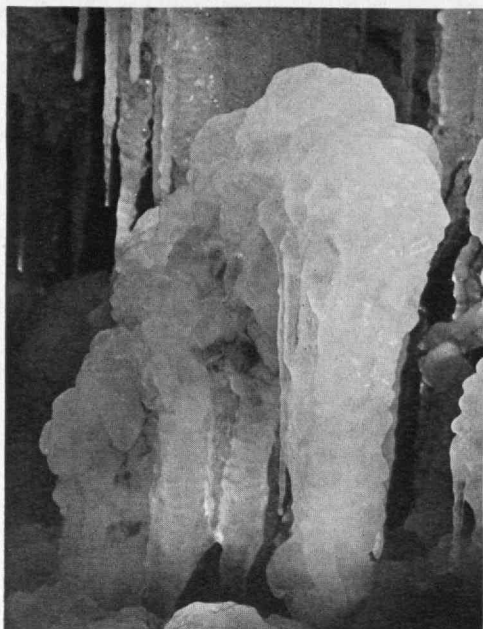
GOOD YEAR
MECHANICAL GOODS

THE TECHNOLOGY REVIEW

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EDITED

AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY



Charles S. Martz

*The white elephant of winter
bowing out*

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From a photograph by Albert B. Vincent

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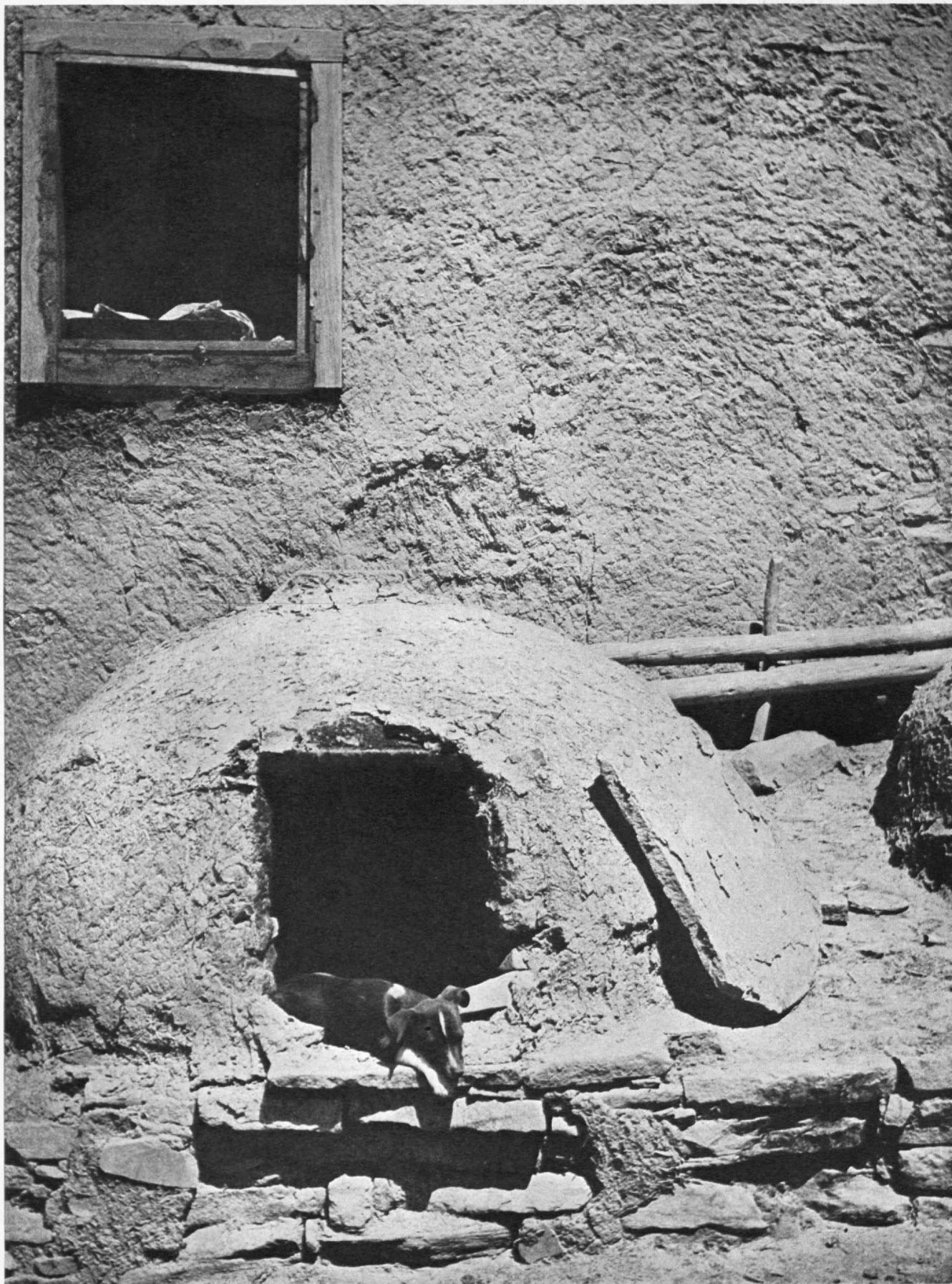
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Paul J. Woolf

Not in the manger, but in the oven, a Pueblo dog has his siesta.

THE TECHNOLOGY REVIEW

Vol. 44, No. 5



March, 1942

The Trend of Affairs

Theater of War

FOR its arena, the Battle of the Pacific has half the surface of the globe. Vastest of the oceans, with twice the area of the Atlantic, the Pacific Ocean stretches over 10,000 statute miles between Panama and the island of Mindanao in the Philippines. From the shallows of Bering Strait to the ice packs of the Antarctic is 9,600 miles. Charts of the Pacific still show islands marked, as in a footnote from *The Arabian Nights*, "Existence doubtful," and shoals whose locations are not known. No sea appears more often in the literature and dreams of the English-speaking world. The name brings up mirages of drama — Pago Pago; of mystery — Easter Island; of beauty — the Marquesas; of danger and sudden death, incredible emptiness, incredible wilderness, the wealth of the Indies.

The Pacific is an ocean of superlatives. It is by far the deepest as well as the greatest of seas. It contains more coral reefs and more islands than any other ocean, the mandated islands of Japan alone consisting of 1,400 bits of land. In the Malay barrier and the East Indies, the Pacific possesses the largest group of big islands in the world, their size not always appreciated because of a favoritism which the Mercator map projection displays toward the higher, colder latitudes, showing them on a far greater scale than they deserve. Although most of these big islands are mountainous, jungle covered, with poor soil and sparse populations, the island of Java is one of the most densely populated of agricultural regions, comparable only with certain sections of China and with the Ganges and Nile valleys. On Java, incidentally, were found the remains of *Pithecanthropus erectus*, one of the earliest of the Dawn men, and possessed of the unenviable honor of having what is probably the smallest brain thus far credited to any manlike creature.

Scientifically, the Pacific is the least known of the oceans. Data on currents in the Polynesian and Malayan archipelagos, which are vital for navigation, have been described as sketchy. Areas measured by the hundred thousands of square miles are still to be marked by their first sounding. The *average* depth of the Pacific is 13,300 feet, and far below this level extend the unique and distinguishing features of the Pacific bottom — its numerous, appalling deeps. Off Guam, for example, is the Nero Deep, 31,614 feet down; off Japan is the Ramapo Deep, 34,626 feet down; and off the Philippines is the greatest of them all — the Mindanao Deep, 35,400 feet from surface to ocean floor. It was measured in 1927 by the German cruiser *Emden*. Since these trenches are almost invariably found close to land and often close to areas of strategic importance in this war, a major naval engagement may well make one of these names as famous in history as it is in geography.

It has long been observed that the juxtaposition of great deeps and high, rugged coasts is associated with instabilities in the earth's crust. Indeed, the boundaries of the Pacific basin can virtually be traced by the position of known centers of earthquake disturbances. Not only is the earthquake belt of the Pacific the most active in the world; in this region have also occurred all of the very deep shocks (originating in the order of 400 miles below the earth's surface) so far observed and a large percentage of the intermediate shocks, which start between 30 and 200 miles down. Disturbances which result from some failure occurring less than 30 miles below the surface of the earth are modestly described as "shallow."

With a large part of its area lying in tropic latitudes, much of the Pacific is characterized by very warm surface waters; the deeper waters, however, are ice cold in the tropics, as in the polar zones. Yet because of an outstanding peculiarity of its currents, the thin warm



Fenno Jacobs from Three Lions

Marking the site of a fatal automobile accident, these shrines stand beside the road between Maria Elena and Tocopilla, mining villages in the great nitrate fields of northern Chile. Transmission lines in the background serve the copper mine of Chuquicamata with power from the generating plant at Tocopilla.

surface layer of the Pacific is far more extensive on the Asiatic side than on the American side. A tongue of cold water originating partly in the Antarctic and partly by upwelling from the cold subsurface layers creeps up the South American Coast to terminate as the Peruvian Current. Another, performing similarly but oppositely on the Pacific Coast of the United States, becomes the Californian Current. Thus the waters off Japan in latitude 40 degrees north may reach 70 degrees Fahrenheit when the water temperature off California in the same latitude is 50 degrees Fahrenheit. Off Peru, only 2 degrees of latitude south of the equator, the surface waters may be as low as 62 degrees Fahrenheit when the water off New Guinea is 83 degrees.

By reason of the high specific heat of water and its ability to mix and diffuse freely, the ocean can absorb tremendous amounts of heat as compared with what an equal area of land can. The oceans therefore act like great thermostats, keeping temperatures above and near them lower in summer and higher in winter than they would otherwise be. No small reason for the close resemblance of many Pacific islands to Paradise (most strongly noted, admittedly, by seamen just off a ship completely free of vitamins and women) is maritime climate, i.e., uniform and high air temperatures.

Because of the direction of prevailing winds, the west coasts of the continents are subject to the climate of the immediate ocean to a greater extent than are the east coasts, which are influenced more by the continental climates originating inland. In the Atlantic, where the Gulf Stream blesses a great area in northern Europe,

much of it north of Labrador, the situation is neatly summed up by a sign on Cape Cod pointing due east and stating simply, "Portugal, 3,000 miles." The extremes of temperature during the year are far greater in Yokohama, for example, than in the city of Berkeley, Calif., almost exactly across from it. Since the eastern coasts on the Pacific are so strongly influenced by the sea, the cold Peruvian Current is largely responsible for repressing rainfall over Peru and parts of Chile. When, occasionally, this current is diverted from its normal course so that the warm Panamanian Current flows past Ecuador and Peru, catastrophic changes in climate occur. Deprived of plant nutrients, sea life greatly diminishes and the guano birds die. Heavy rains, for which the public is unprepared, hit normally desert regions. Such a change occurred between January and March in 1925, and several months ago the Associated Press carried a report of a similar happening in the Galápagos; normally feared for their dryness, the Galápagos became covered with pools and jungles and infested with insects, and much animal life was starving.

The upwelling from the lower levels which occurs in these cold currents (and elsewhere in the Pacific) brings phosphates and nitrates to the surface. With sunlight and oxygen now also available, conditions highly favorable to the growth of plankton are presented, and thus a heavy fish population may be supported. The California fisheries withdraw about 600,000,000 pounds of fish yearly from near-by waters, and it has been estimated that the guano birds of Peru remove 3,000,000 tons of fish annually from the ocean. The fisheries off Japan and the Aleutian Islands are likewise situated in regions where mixing of surface and lower waters is occurring. Of the Pacific currents, the heaviest perhaps is the Kuroshio, which washes the Pacific coasts of Japan. This swift and powerful stream sweeps up to 65,000,000 cubic meters of warm water past Japan every second, equal to the volume of 540 Mississippis.

Hot, Light, and Strong

PLANS for wartime production of magnesium in this country at the rate of 400,000,000 pounds a year indicate the steadily increasing importance of this versatile lightweight metal — the flaming heart of incendiary bombs, the gleaming eye of tracer shells, and the cold, strong substance of light alloys for aircraft engines. Already used to a considerable degree in various household and industrial appliances, magnesium is certain to become one of the most important metals in meeting the pent-up civilian demand for conveniences sacrificed during the war. The use of it in strong, light alloys also suggests that it may well become an important ingredient in the formula for industrial rehabilitation when peace returns.

Reduced to powder, magnesium burns with an intense white flame that is extremely difficult to smother; hence its value in incendiary bombs, tracer bullets, and signal flares. As a substance which can be produced in the form of sheets, rods, extrusions, and castings, magnesium becomes the lightest metal known to man. Less than one-fourth as heavy as steel, magnesium is easily machined, and as an alloy of aluminum it has made

possible important advances in airplane engine design. Only the lack of production facilities prevents wider use of the metal in other airplane parts where its lightness is extremely desirable.

In the vast program to meet the nation's need as quickly as possible, the sea has become the most promising source of magnesium; every cubic mile of ocean is estimated to contain more than 4,000,000 tons of the substance. Magnesium hydrate is precipitated from the water, converted into magnesium chloride, and finally reduced to magnesium by means of an electrolyzing process.

Production of magnesium this year, it is estimated, will reach at least 120,000,000 pounds, but the goal of 400,000,000 pounds a year will not be attained until the completion of plants now under construction which are to manufacture magnesium from ores as well as from sea water.

Istle for Bristle?

UPON hair from the hogs of China the American house-painter has in the main relied in years past. And now as war intervenes between wielders of the brush and the peripatetic porcine fiber factories which hitherto have supplied the brush with bristles, search for other sources takes on importance. The American pig, unfortunately, is somewhat too effete a beast for the purpose; he doesn't run wild and develop long bristles to withstand the winter's rigors. Moreover, most porkers in this country are bred mainly for meat and are slaughtered at a fairly tender age, generally before their bristles have reached paintbrush length. Hence even though nearly a hundred million pigs will be available in the United States this year, a shortage of pig bristles — particularly the long ones useful in the manufacture of

paintbrushes — is foreseen. From the pigs of Russia no surcease is expected; they too have been improved through breeding so that their longest bristles no longer are long enough.

Nylon and other plastics for toilet brushes and horse-hair for floor and dust brushes readily meet many current demands in bristly business. And, in addition, bristle from istle (no, it doesn't rhyme) fibers is of much use. Istle — from the Indian word *ichtli* — is fiber from a group of Central American plants, of which the Mexican agaves are typical. Grandma's century plant was one kind of agave; *Agave sisalina* yields the strong white fiber known as sisal hemp. Istle fiber offers many possibilities; some grades are suitable for abrasive brushes, others for shaving brushes, with many gradations between.

Even so, the remoteness of the Chinese pig is still a problem, for Sir Pig, before he is too much refined and daintified out of his wilderness ways, remains the house painter's best friend. Nature has seen to that; from his unlovely back sprout bristles which no other beast grows and which science has as yet been unable to duplicate. They taper from one end to the other, and the small end is split, or flagged. Because of its taper, the spiny outer equipment of present-day descendants of *Sus scrofa* possesses stiffness and elasticity. Because of its flagged end, it picks up paint and spreads it as the parted nibs of a pen spread ink.

Hog bristles of three inches or more in length are now pre-empted for the filling of war orders, and present supplies are limited. Brush bristles may be expected to keep on coming in from the East, for they are light and compact in relation to their value, requiring little shipping space. Imports from South American countries promise aid. Though in 1939 these imports amounted to only 2,500 pounds, the Department of Commerce lists

At Pedro de Valdivia, one of the storage points for sodium nitrate produced by the Guggenheim process from low-grade ores in Chile. Chilean resources are estimated as capable of supplying world demand for centuries, should the fixation of nitrogen by chemical means fail to do so.



Fenno Jacobs from Three Lions

12,000 pounds as having arrived in 1940 — 8,000 pounds from Argentina alone. In 1941, further increases occurred, considerable amounts coming from Chile. The possibilities of reclaiming bristles from used brushes are being considered. It will hardly be necessary to compel the cultivated American pig to run wild to meet the shortage.

One in Forty-one

THREE and three-quarter billion dollars was the estimated economic loss which the United States experienced in 1941 from death and disability due to accident, according to the National Safety Council. "One in 41 in '41" has a sloganish ring; it is a phrase that might well have been adopted as rallying cry by the forces of disruption. It means that one person in every forty-one persons in the country suffered a disabling injury last year; 101,500 were killed in accidents; 9,300,000 were injured. The death toll was greater by 5 per cent than the figure for 1940. Increases in automobile fatalities and occupational deaths more than offset drops in the figures for deaths resulting from accidents in the home and from public accidents not involving motor vehicles.

An all-time high of 40,000 deaths was set by the traffic toll last year. Falls, second greatest source of

death by accident, led to 26,000 deaths, about the same as in 1940. As a cause of death, accidents were exceeded only by heart disease, cancer, cerebral hemorrhage, and nephritis.

"Approximately 18,000 workers were killed by occupational accidents," said the council in releasing its figures. "An additional 29,000 were killed in off-the-job accidents. This loss of man power represented labor sufficient to build twenty battleships, 200 destroyers and 7,000 heavy bombers."

A decline in traffic deaths was recorded in but six states: Delaware, New Hampshire, Colorado, Idaho, North Dakota, and Wyoming.

Other Oils

NOT all the oil which war brings into the headlines derives its newsworthiness from its importance to internal-combustion engines or to bearings. The products of prolific petroleum, of course, are a focal point of interest because on them so much of the vaunted mobility of Twentieth Century man depends. But other oily matters, less spectacularly conspicuous, make more nearly fundamental claims to attention. The trade of the United States in fats, oils, and oil-bearing materials hence comes under review.

Upon this trade depends a fair share of the food which keeps John Citizen going, the soap which keeps him clean, and the paints and varnishes which keep his surroundings intact if not attractive. Of the nearly ten billion pounds of fats and oils which were consumed in the United States in 1940, 67 per cent went into food products, 20 per cent into soap, 8 per cent into paint and varnish, and 5 per cent into miscellaneous products. Of this total consumption, about 85 per cent was from domestic sources. The imported 15 per cent consisted principally of vegetable oils and the nuts and seeds from which they are obtained. Only in the fats and oils used in edible products has the country been generally independent of foreign trade.

Twelve vegetable oils, imported either as oils or as nuts and seeds for processing, constituted in 1940 about 95 per cent of total imports of fats, oils, and oil-bearing materials of all kinds. Coconut, palm, olive, babassu-nut, palm-kernel, and cottonseed oils are used mainly in the manufacture of food products or soap or both. Much the greater part of imports in this group has in the past come from the Philippines and Netherlands India. The other six imported oils go chiefly into paints, varnishes, and technical uses. Western Hemisphere countries have been the principal suppliers of these six. Most of our imports of the two principal oils in this group — linseed and castor — have come from Latin America. Oiticica oil, a valuable drying material, is supplied entirely from South America, but tung oil thus far comes almost exclusively from China, and perilla and rape oils from Japan or areas of China dominated by the Japanese.

American reserves last fall were over half a billion pounds less than they had been nine months earlier. During the past decade, annual consumption has averaged over nine billion pounds. That so large a proportion of the yearly total used should come from domestic



Paul M. Wiswall, '09

The Temple of Heaven in Peiping, finely wrought and varicolored reminder of an older day.

production becomes a reassuring thought as ocean tonnage is pre-empted for other uses and as war further disrupts the world.

This Chemical Age

BY AVERY A. ASHDOWN

A NEW book* takes its place in a long line of volumes which have sought to portray for the nonchemist the accomplishments of chemical science and to count up the benefits which mankind has received from them. One has but to recall such well-known similar publications as Lassar-Cohn's *Chemistry in Daily Life*, Findlay's *Chemistry in the Service of Man*, and Slosson's *Creative Chemistry*.

The first two chapters of *This Chemical Age* constitute a survey of the chemical background necessary for comprehending the triumphs of chemistry in producing the many man-made materials which have become an integral part of our modern age. To tell this part of the story in a manner which will be satisfactory for the general reader is no light task, and even the chemist will profit by learning how Mr. Haynes has met this part of his problem.

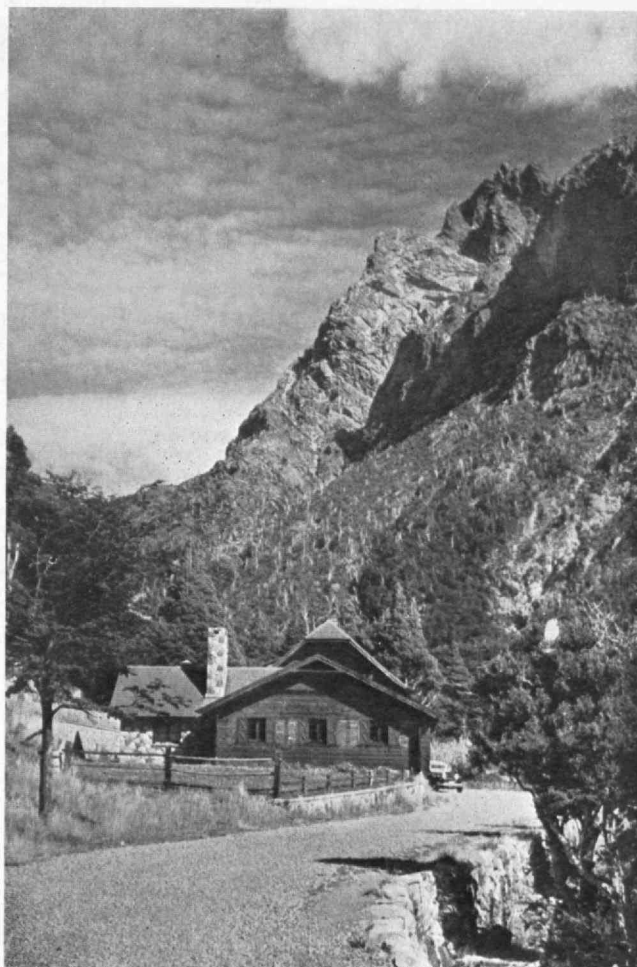
The main body of the book, eighteen chapters, sets forth the growth of chemical concepts, which led first to laboratory experiments and eventually to full-scale industrial processes for the production of materials in quantity. The range is wide, covering the rainbow of colors furnished by the dyes and pigments; perfumes; flavors; natural rubber; synthetic rubberlike compounds; new fibers, such as nylon, rayon, and cellophane; therapeutic agents, represented by sulfanilamide and its relatives; metal and wood finishes; modern plastics. Sixteen natural-color photographs contribute much to the text.

Mr. Haynes ends his book on a note of prophecy. He shares the views of others when he sees a plastic age at hand. At the moment this new era is "... in its initial, experimental stages, which, beginning about 1950, will become a serious competitor with the dominant metal alloys. . . . One dares not dream what plastics and lightweight alloys, synthetic fibers, and a full range of chemotherapeutic agents will do for the human race. . . ."

Salmagundi

RESISTANCE to corrosion is one reason adduced for revival of the manufacture of wrought-iron nails. One producer is square-cutting them from wrought iron in the fashion of a century ago. The holding ability of the old-timers — well known to many an amateur house-restorer — is cited as another advantage. ¶ Lard, boxed and frozen, is used to line the holds of ships in a new refrigeration technique for storing meat. Into the vessel go boxes of meat products which have been frozen, box and all. The frozen lard is packed around them, taking the place of the usual insulation, and more frozen lard is used to seal the top of the load. The method is designed to speed lease-lend shipments in

* Haynes, Williams. *This Chemical Age: the Miracle of Man-Made Materials*. New York: Alfred A. Knopf, 1942. Pp. xii+386+xxiv. \$3.50.



Chester H. Pope, '09
In the Argentine lake region, Bahia Lopez is thus seen from Huapi National Park.

ordinary steamer holds. ¶ Unique among the countries of the Western Hemisphere for its deposits of diamonds, Brazil is being heavily drawn upon for industrial stones needed to meet extra demands imposed by wartime requirements in the United States. Agreement through the Metals Reserve Company, a subsidiary of the Federal Loan Agency, that the United States buy a maximum of 300,000 carats annually from Brazil for a period of two years promises expansion of production. Average annual production of industrial diamonds in Central and South America together has been about 300,000 carats. Recent imports by the United States from these nations have not exceeded 250,000 carats a year. ¶ Testing the acidity of gases driven off during the roasting of coffee is the crux of a recently patented method designed to improve the breakfast brew. Heating the beans for a certain time and to a certain temperature — the method hitherto used — cannot allow for variations in moisture content and other factors, it is argued. Volatile acids expelled during roasting, the inventors of the new process hold, have a direct relation to aroma and flavor. Consequently they tap the gases from the flue of the roaster, condense and dissolve them in water, and measure the acidity of the solution. Sudden rise in the rate of expulsion of the gases is declared to mean that the point of maximum flavor has been reached. ¶ Dipping green wooden tool handles (Concluded on page 246)

On the Chemistry of War

An Examination of a Modern Alteration in the Penalties of War, With an Appraisal of What American Chemists Are Contributing to the Nation

BY AVERY A. MORTON

IN ancient times, the havoc created by war consisted of tributes levied and liberties restricted or, in its worst form, of cities pillaged and inhabitants slaughtered or enslaved. In modern times, save for the outright enslavement of the conquered, war imposes most of the same penalties upon the loser, albeit by more highly developed methods. The complexity of life in a scientific age has, in addition, introduced other penalties which naturally are most apt to fall upon the loser but may be shared by the victor as well. The explanation for this fact is that war accelerates and often initiates scientific and technological developments which in the normal course of events would have progressed slowly or remained dormant for long periods. These developments must, naturally, be made with the aid of whatever natural resources are at hand. Since all resources must be exploited to the limit during time of war, it follows that the fortunes of war are apt to favor the nation or group of nations which has the greatest natural resources to support the industrial background for war. One may therefore marvel that nations which cry loudest over their "have not" condition should, in the face of that admitted disadvantage, choose to resort to war and by that very act accelerate industrial change and thus make certain their own financial ruin. Under a peaceful régime a moderate portion of the effort now diverted to war could either have staved off the changes altogether or have provided time to develop the means of economic survival. Such a state of affairs was made plainly evident in the chemical field during the last war and will unquestionably be seen again as an aftermath of the present conflict.

One of the acknowledged losses by Germany as a result of World War I was her place in the dye industry. This was not one of the penalties imposed by the Versailles Treaty, nor did the denouncement of that document by the Germans correct the loss. The penalty was self-imposed by Germany's entrance into armed conflict. The coal-tar dye industry began in 1856 when the Englishman Perkin discovered mauve, sometimes called "Perkin's violet." Germany, however, rapidly assumed the lead in this field and before the first World War she produced more than three-quarters of the world's supply of dyes and nearly all of the necessary intermediates. One of the crowning glories of her chemists during the pre-war activity was the synthesis of indigo. This feat, it might be noted, was as important as any of her military conquests might have been, for it brought to Germany an industry which had previously been considered the sole property of the Dutch in the

East Indies. The result could not have been more effective if Germany had conquered the industry by force.

The United States, prior to 1914, occupied a very lowly position in the dye field. We produced only about 10 per cent of our consumption of dyes and imported 90 per cent of the intermediates required for even this limited quantity. Only seven companies were making coal-tar products, and they were little more than assembling plants. Our total production of dyes was 6,619,729 pounds, which were valued at \$2,470,096. The value of all our other coal-tar products was \$1,126,699. How long this condition might have continued is not certain, but the local dye industry is generally acknowledged to have been operating under an unfavorable tariff, to have been subject to cutthroat competition from Germany, and probably to have been going from bad to worse. The potentially vast industry made possible from the enormous quantities of coke produced for a great steel industry was spewed into air as so much worthless material while the country imported three hundred to four hundred different dyes from Germany.

The outbreak of war and the consequent British blockade compelled this country to recover the by-products from its coking processes and to make its own intermediates and dyes. By 1917 the production of dyes had reached nearly 46,000,000 pounds and their value was \$57,000,000, a figure which guaranteed the permanence of the new industry. In 1941 this branch of the United States chemical industry produced approximately two thousand trade colors, valued at nearly \$110,000,000. The number of companies manufacturing dyes and other synthetic chemicals was over two hundred.

Germany sacrificed not only her great dye industry but also the allied products which come from coal-tar compounds. In view of the fact that the explosive industry is closely related to the coal-tar developments, the United States at the outbreak of this war was comparatively much stronger and Germany much weaker in this military aspect of chemistry than had been true twenty-eight years ago.

Since natural products can now be replaced by synthetic ones, a trained scientific personnel can be as much of an asset as a natural resource. Before the previous war, Germany had been the center of scientific effort. Students the world over traveled to her laboratories and contributed to her success. That period saw the development of the famous Haber process for the synthesis of ammonia from nitrogen and hydrogen. The

completion of this problem was a tribute not only to industrial ingenuity but also to the scientific atmosphere to which the problem owed its genesis. Haber had, in fact, abandoned the project as being impractical and had published his results for such academic value as they might have. His figures, however, did not agree with those predicted from an equation used by Nernst, another German scientist. From the discussion and experiments which followed over this purely academic question, the feasibility of the synthesis as a commercial process became apparent. The industrial realization was considered one of the outstanding achievements of a scientific age. Germany's position as a center for research was indeed one of her great assets.

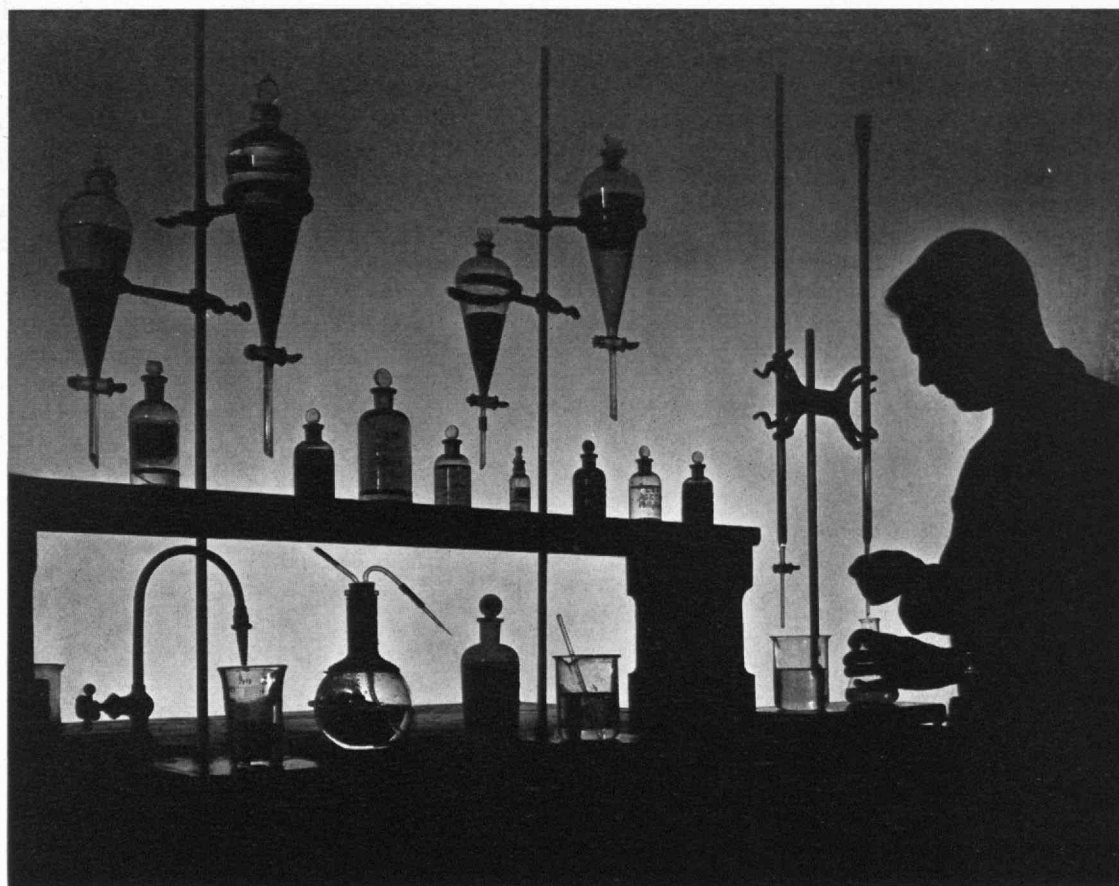
Here, again, her act of war stimulated the development of trained men in this country and elsewhere and imposed upon Germany the loss of that priceless leadership which had been the admiration of the world. Figures which represent the change exactly are perhaps hard to give. Nevertheless, the percentage of abstracts of articles appearing in scientific journals reporting new research is a fair index of the comparative activity. These values, made by "Chemical Abstracts," are given below and show the comparison for the years at the outbreak of each war:

	1913	1939
United States	20.7	27.5
Germany	34.4	18.4
British Empire	14.4	14.0
France	13.0	9.1
Russia	2.5	11.1
All others	15.0	19.9

Part of this German decline must, of course, be ascribed to the political stupidity of the 1930's which closed many university laboratories and banished capable scientists for no reason other than their "non-Aryan" parentage. Even the brilliant Haber, whose process had actually made possible Germany's prolonging of the last war, was not exempt from the persecution. All of the change, however, is directly or indirectly related to the past war. It is interesting to speculate on the things which her scientists might have accomplished and the territories, figuratively, which they might have acquired had the war lords of Germany been able to realize that the role of an aggressor nation in modern warfare is apt to carry penalties not covered by peace treaties — penalties that she could ill afford to accept.

The present conflict is witnessing again some of the same phenomena, although no one of the Axis nations enjoys the position which Germany did before 1914. Chief among the present emergencies — in fact, occupying the position which the field of dyes and allied chemicals held in the last war — is the rubber problem. Synthetic rubber has been the dream of chemists for a long time. Two years before even the last war, a set of tires made from synthetic rubber and costing \$5,000 each was displayed at the eighth International Congress of Applied Chemistry as the work of German chemists. The problem was therefore one which was definitely in mind. The war accelerated the efforts to solve it, at least the efforts of Germany. By a very expensive and time-consuming process, involving the polymerization of butadiene in galvanized-iron drums maintained at 60 degrees centigrade over a (Continued on page 232)

" . . . Maintenance of our enviable position . . . rests, in part . . . upon our own efforts to continue scientific advancement in new fields."



F. S. Lincoln, '22, from Interchemical Corporation

Aide in Aerodromics

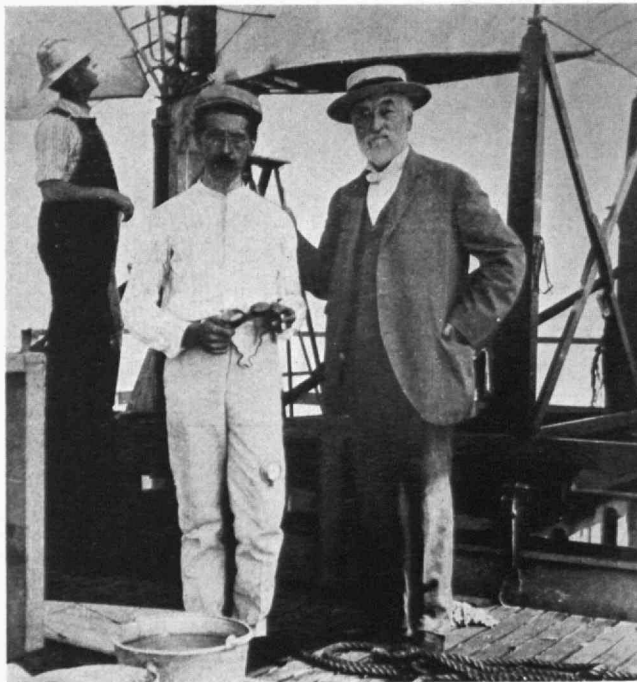
How Charles Matthews Manly Worked at the One Aeronautical Engineering Job to Be Had in the United States in 1898 — Assistant to Samuel Langley

BY S. PAUL JOHNSTON*

IN 1898, the odds against any engineering graduate's being offered a job as an airplane designer or pilot were colossal. No high-powered personnel directors dangled fancy salaries under his nose. No spurred and belted recruiting officer stood by with promises of bars for his shoulder or wings for his chest. In fact, in the spring of '98 only one aeronautical engineering job was to be had in the whole United States.

It was offered by Samuel Langley, then Secretary of the ancient and honorable Smithsonian in Washington, who had been working for ten years trying to prove that a man could fly through the air without benefit of hot air or of hydrogen. He had studied the lift and drag of various wing forms on the whirling arm which he had devised. He had built and flown fragile rubber-powered models. By the end of 1896 he had to his credit a number

* This article is based on material furnished mainly by Charles Manly's younger brother, Basil Manly, now a member of the Federal Power Commission; by his nephew, Charles Kendrick; by his business partner, C. B. Veal; and by his first love, the Smithsonian Institution. A letter-press book containing copies of Charles Manly's correspondence and reports between August, 1899, and September, 1905, was made available by Basil Manly. As source material, it was invaluable.



Samuel Langley, Secretary of the Smithsonian Institution, and his courageous aide, Charles M. Manly, photographed for the record in the final minutes before Mr. Manly took off in Langley's aerodrome for the test of October 7, 1903.

of reasonably successful flights with steam-driven model "aerodromes" of up to 25 pounds in weight, launched from a catapult mounted on top of a houseboat on the Potomac.

By the spring of 1898 the news of these flights had finally made its way across Washington's mall, up Pennsylvania Avenue (with a detour around the Treasury), and had induced a faint spark somewhere in the gloomy depths of the State, War and Navy Building. On May 9, 1898, Langley wrote a guardedly enthusiastic note to his old friend R. H. Thurston of Cornell:

I mention in especial confidence that official enquiries from the Army and Navy lead me to think it possible (I hardly can say probable) that an aerodrome capable of a speed of 30 miles an hour maintained for three hours, carrying an "aeronaut" and possibly some missiles may be attempted. I think it practicable though not to be realized without trial. I should try to have some form of gas engine.

Thus, the come-on; then, the offer:

Have you any young man who is morally trustworthy ("a good fellow") with some gumption and a professional training? If nothing comes of this, I have still some work for such a one in experimenting here, on aerodynamic data, etc.

Certainly the Langley letter contained little to stampede the Class of '98. In those days the path that lay ahead for the engineering graduate was clear and well marked. Beams, Boilers, and Bridges were the things for a young fellow to get his teeth into. There was even some talk of horseless carriages that might sooner or later benefit by a little engineering — but an aerodrome? Well, it was pretty sketchy stuff at best, not much of a prospect for a Lifework. This, however, was something beyond the ordinary. More than gumption would be needed; imagination was the essential ingredient. It called for the best Cornell had to offer. Dr. Thurston ran his eye down the list and drew a line under the name Charles Matthews Manly.

Just what made young Manly forego the pleasures of Beams, Boilers, and Bridges for the doubtful rewards of aerodromics is not a matter of record. By whatever process he reached his decision, it did not take him long. He did not even wait to be graduated properly — his diploma was granted *in absentia*. On June 1, 1898, he reported (sight unseen) to Dr. Langley in Washington, signed the pay roll for the munificent sum of \$1,000 per annum, and presently became aide in aerodromics — the only holder of that alliterative title in the whole history of aeronautics. (When he wound up his work with the Smithsonian in the spring of 1905, he was drawing \$2,500 a year.)

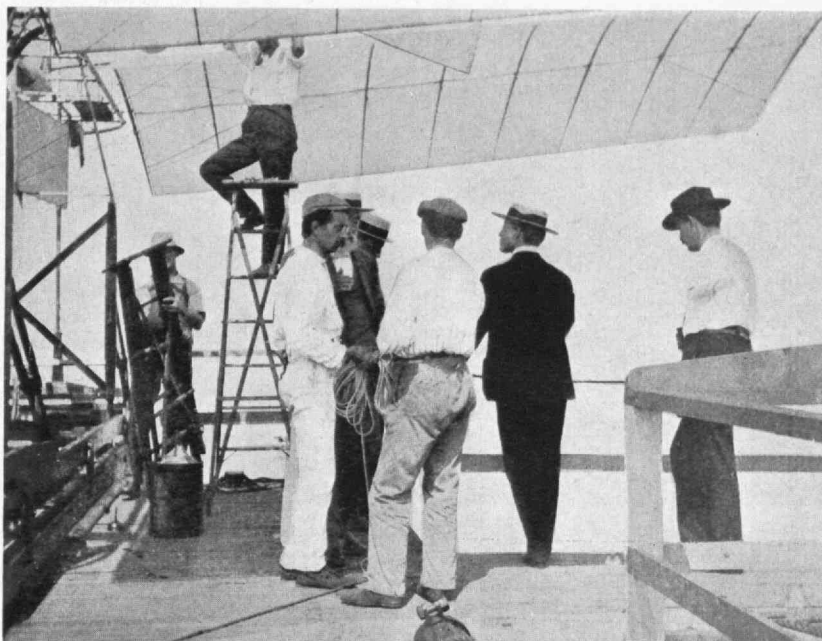
If Charles Manly had had any prior interest in flying machines, it had been well concealed. Born in 1876, he was raised in the small southern town of Staunton, Va. There he lived the usual outdoor life of the average youngster of the town, without exhibiting any particular interest in anything of engineering or science. He was well into his salad days when he fell in with the manager of the local electric power station — an engineer, a Cornell man. Out of their talks of kilowatts, of horsepower, and of B.t.u.'s, young Charles began to form some pattern for his life. He read engineering books and papers. He reshaped his college courses. He laid the foundations for a first-rate knowledge of mathematics and of science. After he was graduated from Furman University (Greenville, S. C.) in 1896, he achieved the first of his self-set goals: He entered Sibley College of Engineering at Cornell University in the fall of that year. Although Dr. Thurston's choice two years later indicated something of his pupil's academic standing, Matt Manly was no "brown bagger." He was active in extra-curricular activities on the campus. He was interested in athletics, but confined his own participation to tennis, which he played passably well. He continued to play when he could find the time throughout his life. As a matter of fact, his death in 1927 followed a heart attack after a vigorous set of tennis.

Neither at college nor in his later life was Manly a recluse. His work occupied most of his time, but when he could, he liked to dance and to mingle with people socially. He liked the theater and occasionally took to music for relaxation. Never the life of the party, he was popular in a quiet sort of way with men and women. He had a keen sense of humor — never slapstick, sometimes salty, and, if occasion seemed to warrant, with a sting in it. His major group interests were in the engineering societies, but in the early 1920's he was often seen at the Kew Gardens Country Club on Long Island. All his life he was an active member of Sigma Xi Fraternity. He was a Southerner of the Southerners and liked nothing better than to hold up the southern side of the argument in any "bull session" with the "damn Yanks."

The two years after graduation were busy ones for Manly. Ten years later he was able to give a full account of them in the *Langley Memoir on Mechanical Flight*, which he authored jointly with Langley. But not until March 7, 1900, did he find breathing spell enough to write a brief report of his work to Dr. Thurston at Cornell:

I have been expecting for more than a year now to write to you, and recalling your unusual kindness to me while I was at Sibley, I can assure you that nothing but the very great pressure of work which I have had ever since I have been here could have prevented me from writing earlier.

I have been exceptionally busy both day and night since I last saw you in Ithaca, just prior to my coming to Washing-



Mr. Manly with Dr. Langley and War Department representatives on the houseboat just before the trial of the aerodrome on October 7, 1903

ton, the work here having of course been very absorbing and the pressure of it very great. At the same time, however, my relations with Mr. Langley have been of the most pleasant nature from the very beginning, and there has never been a time when he has not manifested the most kind and pleasant disposition toward me, and I desire to express to you my belief that this has been very largely due to the very kind letter of introduction which you gave me when I first came here. Knowing your very deep interest in the work which is now going on here, I regret very much that I am not at liberty to speak of the details of it, as . . . innumerable . . . very interesting problems are constantly presenting themselves.

As you will readily understand, my responsibility in the work covers not only mechanical engineering problems, but one might almost truthfully say that a small amount of every branch of physical science is included in the general make-up of the problem. . . . I have now quite a large force of workmen both expert machinists and skilled carpenters, the total number in the Institution shops being more than a dozen besides a large amount of special contract work both in New York and elsewhere, which demands constant supervision. I have also had added some of the best machines of both Brown and Sharpe and Pratt and Whitney. From this it will be seen that there is very little time left for research work in other branches of engineering. . . .

By this time, Langley and his aide were plunged deep in the business of building a full-sized aerodrome. The Board of Ordnance and Fortification of the War Department had finally put up \$50,000, and the Smithsonian had contributed another \$20,000. Because Langley believed it a mistake to abandon an idea that had once proved successful, he stuck to the notion of launching the machine from a catapult, as he had done with the models. He liked the houseboat, too, because he thought he could anchor it in out-of-the-way places and avoid publicity. He miscalculated on that score. The reporters watched through telescopes and gleefully headlined his failures. Perhaps he might have been spared some of the ridicule that was heaped on him had he been a little more co-operative with the press.



Assembling the large Langley aerodrome on the houseboat on the Potomac. Charles M. Manly stands on the frame.

Langley provided only the broad outlines of design for the aerodromes, the power plants, and the launching devices. Manly worked out the details, supervised the construction, and superintended the tests. He is remembered mainly for his brilliant work on the engines, but he played an equally important part in the design and construction of the quarter-scale and full-scale aerodromes. Nowadays, when in peaceful times spark plugs and coils and wire and distributors and valves and pistons and rings and gaskets and gadgets are to be had at any neighborhood service station, it is difficult to recapture the sense of frustration that must have been experienced a thousand times by the experimenter at the turn of the century. He had to invent, design, secure materials for, and build every single item and part before he could test its behavior as a *component* in the main job at hand. A careful reading of the *Memoir* yields hundreds of examples of such engineering and mechanical accomplishments. He did not brag about them. His statements are the direct, impersonal reporting of an engineer: "This was the problem. We tried this — it did not work. We tried that — a failure. We finally hit upon method C (or possibly Z) — it worked."

Because he did much of the work with his own hands, he had to become skilled in a dozen trades as he went along. He made himself into a first-rate mechanic. Over and over again when others failed on a difficult assignment, he picked it up himself and finished it. During the construction of the large engine, it became necessary to do a tedious and difficult job of brazing to assemble cast-iron liners in the cylinder jackets. In describing this work in the *Memoir*, he says, "As no workman could be found either competent to do the work or willing to undergo the personal discomfort, the writer was obliged to do all this brazing work himself." He does not mention the fact that the many hours put in over the brazing furnace in 1901 and 1902 impaired his eyesight for the rest of his life.

Any hope that Langley or the War Department may have had of securing a practical flying machine for active service in the war with Spain faded, as month after month and year after year went by and the machine remained in an unfinished state in the Smithsonian

shops. Like many another experimenter of those years (including the Wrights), Langley was having "engine trouble."

About the time he hired Charles Manly, Langley was negotiating for the development of an engine suitable for a full-scale aerodrome. As a starter, he wanted something of about 12 horsepower and of around 100 pounds in weight. He finally unearthed a New York inventor and engine builder, Stephen Balzer, who was confident enough of his own abilities to take on such a seemingly impossible job. He had a design for a five-cylinder rotary air-cooled engine that he thought would meet the specifications. Langley gave him a contract. Balzer soon found that he had bitten off a great deal more than he could chew. Two years later he was still struggling to make the engine run for more than a few minutes at a time. At best, it showed only a brief three or four horsepower. One of Manly's first assignments was to work with Balzer to try to salvage something in the way of a finished engine out of the contract, but the task proved impossible.

By 1900 Balzer was almost out of funds (in his efforts he had used up the entire allotment of his contract), and the money remaining for the aerodrome was running low. Things looked so hopeless that Langley and Manly went to Europe that summer to see if they could locate an engine that might do the work. Their search was fruitless. Their proposed specification for power and weight netted only ridicule. De Dion, the great French engine designer, told them that he could not build such an engine; *ergo*, it was impossible. Langley continued the search in England and Germany. Manly returned to the States in mid-August to find Balzer completely bogged down. Something had to be done, and quickly.

At that point Manly went out on a limb. Reporting Balzer's situation to Langley, who was still in England, Manly requested permission to take over the whole engine project himself — an ambitious undertaking for a youngster only two years out of school. In desperation, Langley agreed, and the aide in aerodromics went to work in earnest. How well he succeeded is a matter of record.

During these difficult days, Manly's relationships with Balzer were always amicable. He wrote frequently. He telegraphed occasionally. He was often a visitor at the Balzer residence when he was in New York. There is no doubt that he picked up a good deal of sound mechanical information from his contacts with Balzer. In the *Memoir* he gives full credit to Balzer's contributions, but the fact is that the final Manly engine was widely different in principle and in detail from the markedly unsuccessful Balzer engine of 1900. If anything, he succeeded in spite of, rather than because of, any ideas that had been contributed previously. Balzer himself never claimed any responsibility for the successful engine during Manly's lifetime. Not until five years after Manly's death, when Stephen Balzer was approaching eighty years of age, were any claims made on his behalf.

Manly retained only the star-shaped cylinder plan of the Balzer engine — an arrangement not uncommon in certain European designs of (*Continued on page 234*)

Food for Britain

Rationing and Price Control Are Basic in Present Policy; Early Inauguration of the System Has Helped Morale; Planning Overcomes Many Problems

BY ROBERT S. HARRIS

THE two main planks of the British food system, as far as distribution is concerned, are rationing by individual coupons and control of prices. In the first World War the British were tardy in developing a food policy, and the people were not assured a basic food supply until 1918, when rationing was invoked. In the present emergency, rationing of rich and poor alike was instituted within four months after the declaration of war. This action has helped morale, for rationing is a government guarantee of a minimum food supply to every person, day in and day out, despite sinkings and bombings. Since an increase in the allowance is a symbol that the Battle of the Atlantic is going well, alteration in the ration has had marked political effect.

The food-rationing system has imposed great rigidity on the import requirements of the British Ministry of Food, for the ministry must plan ahead, and the problem of importing goods from all parts of the globe is enormously difficult during war. Very large stocks of goods cannot be accumulated in Britain, because of lack of storage facilities, because distribution is difficult, and, principally, because the accumulation of large stocks for reserve purposes limits the importation of other goods which are currently more vital. The import program is one of perpetual compromise, with local and external conditions as influencing factors.

On the ration list today are those foods which contribute effectively to assuage the physiological hunger (foods such as meats and dairy products) and those which satisfy what may be called the psychological hunger (products such as tea, jam, and onions). The weekly ration now includes ten ounces of fat, twenty-four cents worth of meat, four ounces of bacon, eight ounces of sugar, two ounces of cheese, and two ounces of tea. The sugar, fat, and cheese allowances were recently lowered because of a change in the shipping situation brought on by the war in the Pacific. Farmers, miners, and others whose work is heavy are now allowed twelve ounces of cheese weekly, partly because of the convenience of a cheese sandwich and partly on the basis of the theory, now disproved, that manual labor increases protein requirements.

Meat is rationed on the basis of cost rather than of weight. This clever device, used in the last war, induces people to buy the cheaper cuts, thus ensuring the consumption of the less desirable parts of the carcass. A system of prices controls all foods, rationed and unrationed. The retail prices of some foods, such as milk, eggs, potatoes, and bread, are kept within reach of the public by a government subsidy which now costs

\$500,000,000 yearly. The food ministry controls prices by buying food or authorizing a public-controlled company to do so. Companies have been formed to buy the entire egg, onion, and carrot crop and to market these commodities at low prices.

More goods are controlled by price than by rationing, and largely on this account present food prices are reasonable: Cheese is twenty-two cents a pound; enriched margarine, nine cents a pound; meat, fourteen to thirty cents a pound; bread, fourteen cents for four pounds. Since the start of the war, investigators have tried to ensure the success of these control systems by making certain that shopkeepers do not sell at figures in excess of the top prices. Also, a campaign has been waged against the "black market," where firms sell rationed foods at excessive prices. This problem has been successfully met by the licensing of all handlers of foods.

At present, children have a priority on the liquid milk supply. Expectant mothers and children under six are guaranteed one pint daily; bottle-fed infants, two pints; children between six and seventeen years, one-half pint daily. Adults have the remainder of the fluid milk and also the dried, evaporated, and condensed milk.

Exceptions are made for (a) workers temporarily incapacitated; (b) persons recovering from major operations or having illness characterized by high and prolonged fevers; (c) sick children not attending school; and (d) persons suffering from active tuberculosis; silicosis; affections of the mouth, throat, or gullet; organic nervous disorder causing interference with swallowing; gastric, duodenal, or anastomotic ulcer; certain cases of dyspepsia due to conditions other than ulceration of the stomach or duodenum; colitis; *diabetes mellitus*; thyrotoxicosis; or nephritis. If the required certificate signed by a medical practitioner is obtained, these sufferers are allowed up to two pints of milk daily for periods normally not exceeding one month.

Lend-lease imports of canned and dried milks have made possible the diversion of all liquid milk to children and to the sick. Needy children receive milk free or at a cost of one cent. The consumption of milk in England and Wales has increased since the war started, and milk production is ranked by some as of importance equal to munitions production. Animal feed is scarce in Britain, as much of it must be imported. Since the same quantity of animal feed will produce twice as much nutrition in the form of milk as in the form of meat, the use of fodder for milk production is more economical than for meat production. For the same reason, eggs should have a priority over meat; but egg production cannot be

maintained in Britain now, because its poultry industry has been developed with a great dependence on grain imports. Grazing animals have not been affected so much.

Wild-rose hips are being gathered from the hedgerows by members of women's institutes, school children, Boy Scouts, and Girl Guides. The *Lancet* reports that authorities hope to convert 500 tons of these hips into sirup and that F. Pezold has stated that wild-rose hips contain between 0.5 per cent and 1.1 per cent ascorbic acid.* If 0.7 per cent is average, the sirup from 500 tons of hips would contain 7,000 pounds of ascorbic acid, or enough to meet the ascorbic acid requirements of nearly 300,000 persons for an entire year. This interesting development may be a significant factor in relieving the ascorbic acid shortage.

Announcement recently was made that during January and February children under two years of age were to be given daily portions of black-currant juice (rich in ascorbic acid), and that subsequently orange juice prepared from concentrates sent under the Lend-Lease Law would be donated. Thus the estimated daily requirements of ascorbic acid will be supplied to all children under two. Older children must try to secure their ascorbic acid supply from potatoes and such fruits and vegetables as they can obtain.

In the same way, cod-liver oil compound is being distributed to all children under two years old. By now, this service has probably been extended to all under five. Since Britain has about 1,365,000 children under two and 2,000,000 more between two and five, the program to ensure the vitamin A, C, and D intake of British youngsters is a formidable one. American shipments of citrus juices and fish oils have, to a great extent, made possible this government service.

The great curtailment in food imports into Britain has been largely offset by an increase in production at

home. By rationing and subsidy, food is being brought within reach of the poorest; luxury feeding has suffered a reduction to the benefit of everyone. The claim by Lord Woolton that less malnutrition exists today than was present in peacetime has recently been supported by Dr. Dagmar C. Wilson, who concluded from a study of 499 Oxfordshire school children that between December, 1939, and April, 1941, no increasing nutritional deficiency and no deterioration in nutritional status were evident.† It may be too early to reach such a conclusion. V. H. Mottram has predicted that the British diet may become deficient in first-class protein, iron, calcium, and most vitamins, because only about two ounces of meat each day are available to a person; unrationed foods such as poultry, game, eggs, and fish are expensive; cheese and milk are scarce; bananas are no longer imported; and citrus fruits are extremely hard to get.

He suggested meeting the problem through changing to a diet of whole-meal bread, green and root vegetables, potatoes, and oatmeal, with some meat, cheese, and milk. This diet would support adults but would be deficient in calcium and perhaps in vitamin D. Furthermore, the Mottram diet falls far short of supplying the thirty-seven grams of first-class protein supposed to be essential to an adult. Professor Mottram suggested as a happier alternative that the dietary be left alone and that the vitamin and mineral deficiencies be cared for by importing from America capsules and tablets containing vitamin and mineral concentrates.‡

There is reason to question the recent article by Miss E. M. Weddowson and Miss B. K. Alington which reported that in the spring of 1941 the average Englishman was eating only one-half as much bacon and sugar, one-third as much meat, butter, and jam, and one-fifth as much cheese as in 1935.§ These authors based their

† *Ibid.*, 241: 405 (October 4, 1941).

‡ *Ibid.*, 240: 159 (February 1, 1941).

§ *Ibid.*, 241: 361 (September 27, 1941).

* *Lancet*, 241: 457 (October 18, 1941).



In a thickly populated South London district, pink coupons for food rationing are here shown being delivered by mobile van. Congestion that would ensue at the food office is thus considerably relieved. The mobile van is equipped with loud-speakers to attract attention and can distribute 1,000 coupon books each hour.

Acme

Food and drink are supplied to bomb victims in England by the crew of one of the mobile canteens established for emergencies.



Acme

estimates on a small population sample, and their findings are not in agreement with the Ministry of Food and the Carnegie surveys made several months after the war started. The latter reported conditions to be much the same as before the war. In all probability, the ascorbic acid intake has been lowered because of restrictions in foods which are good sources of vitamin C, the nutritional value of the protein in the diet is lower, and the vitamin A intake has possibly suffered a decline. On the other hand, the people of Britain have improved their calcium intake, largely because their milk consumption is 200,000,000 British gallons more than heretofore, an increase of about 20 per cent.

More potatoes, rice, oatmeal, and bread are being consumed also. If this diet is not wisely diversified, it represents a lower standard. The food situation will soon be markedly improved because of the huge amounts of evaporated milk, milk powders, cheese, and other foods which are being sent from this country. By spring, the British people will probably be better fed than they were before the war. This improvement would not represent dietary perfection, because the British pre-war dietary was admitted to be poorly balanced.

Britain is prepared for catastrophe. The island has been divided into eighteen areas, each of which is subdivided into one hundred compartments. Elaborate arrangements have been completed for the accumulation and distribution of stocks of food in each of these depots, or "shadow larders." Each depot has sufficient food to supply the population in its precinct for two weeks, and each of the eighteen areas has extra emergency supplies ready to meet invasion or air raid.

Food traders have made pacts to care for customers of a trader whose shop is demolished. "Shadow" shopping-centers, to function when shopping districts are extensively bombed, have been chosen; and traveling shops will take to the road to serve smaller towns, where 2,500 food organizers have been appointed to

distribute the government's emergency food stocks if the district is isolated. Emergency stocks include biscuits, corned beef, canned soup, canned sugar, canned margarine, and tea. These foods will hardly make a good dietary, and they are deteriorating nutritionally during long-time storage in depots. Stable vitamin concentrates might advisably be added to these supplies. All emergency foods are protected by gas-resisting tarpaulins. Though gas has not yet been used against the British, a food decontamination training center has been established. Also, arrangements have been made in 1,400 industrial plants to salvage water-damaged foods.

The second line of emergency food defense is British Restaurants and other communal feeding centers which are being established in all industrial sections for the emergency feeding of people in blitzed areas. These restaurants provide a meal of meat, two vegetables, and a sweet, for about twenty cents or less. The food may be taken out and prepared in the home. The labor in such feeding centers is voluntary, and therefore British Restaurants can serve meals more cheaply than can commercial cafés. By September 15, a thousand of these restaurants had been opened. The main objective is to put *normal* feeding establishments, rather than *emergency* feeding centers, into operation, for the feeding of factory workers has been made urgent by the war. These centers may even become a permanent feature after the war.

The third defense is in Emergency Meal Centers, which will be established on the outskirts of any town of more than 50,000 persons. Unlike British Restaurants, these centers will open only during an emergency. The fourth and fifth defense schemes are the Rest Centers, run by the Ministry of Health, and the Air Raid Shelters, the patrons of which London and thirty provincial towns have arranged to feed. Lastly, there are "Food Grids," which are cooking depots established within ten miles of the town (*Continued on page 242*)

Wells of Power

The Unseen Reservoirs of American Petroleum Are Crucial Resources; Improved Drilling Methods Speed Production of a Vital Material

BY GILBERT W. NOBLE

OIL, not only one of the chief sinews but also one of the chief prizes of this war, daily becomes more conspicuous in the news. From the attack at Pearl Harbor through the push into the South China Sea, Japan's frantic thrust for sources of black gold has been obvious. To meet and to stop this venture and the greater war of which it is a part, American petroleum production, always of major importance in the world, is now crucial. Hence the means by which the unseen reservoirs of hundreds of American oil fields are tapped possess today a peculiar interest.

During 1940, approximately 2,150,000,000 barrels of 42-gallon capacity were needed to supply the world's demand for petroleum. About 63 per cent of this quantity was produced by the United States. To get a better idea of the actual volume involved, we might use the Charles River basin as a measure. The Metropolitan District

Commission estimates that from the Craigie Bridge to the Watertown Dam the basin normally holds about 4,000,000,000 gallons of water. If all of this water were replaced by petroleum, it would take care of the country's current consumption for a little less than 26 days; or, to put it another way, the basin would have to be refilled about 14 times a year to take care of our national demand for oil.

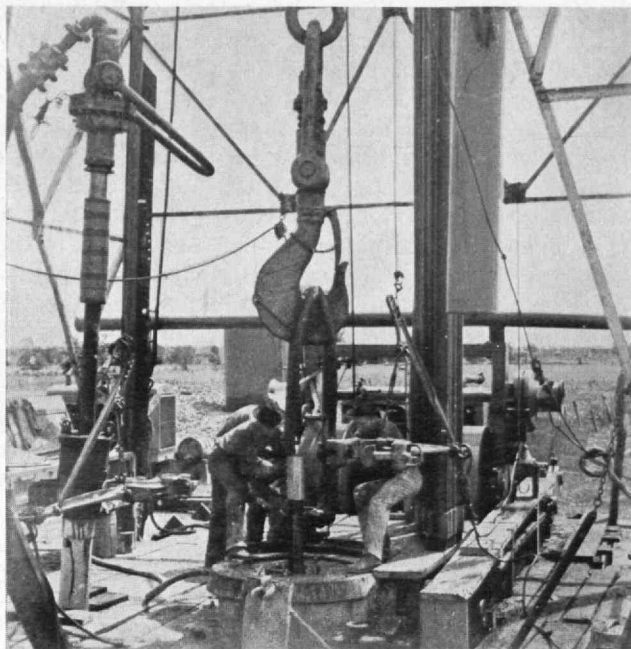
About 380,000 wells located in twenty-three states supplied this oil. The potential daily rate of production from these wells varies from less than $\frac{1}{5}$ of a barrel up to several thousands of barrels per well, but the arithmetic average is less than 10 barrels per well per day. This low yield is due partly to the large number of stripper wells which are nearing economic exhaustion and partly to state regulations which limit the daily rate of production in order to prevent the economic waste that would accompany too rapid exploitation of our oil reserves. Every year 20,000 to 30,000 wells are abandoned after reaching their economic limit under existing conditions of costs and price of oil, and every year 30,000 or more new wells are drilled in an effort to discover or develop fresh oil supplies. In 1940 about 70 per cent of the wells drilled produced oil in commercial quantities, 8 per cent produced gas in commercial quantities, and 22 per cent were classed as dry holes, having yielded neither oil nor gas in commercial quantities. Though these percentages vary somewhat from year to year, they are a typical batting average.

As early as the Seventeenth Century, the Chinese drilled brine wells to depths of 1,200 to 1,500 feet by suspending iron bits from bamboo strips. In the first oil wells drilled in this country the same principle was used, but hemp cable was substituted for bamboo strips, and the weight of coolie bodies jumping onto and off a platform on the end of an inclined wooden pole gave place to a steam engine which operated a crank that oscillated a beam raising and lowering the bit. This percussion, or cable-tool, method shatters rock by impact from the heavy steel bit; the ground-up rock, mixed with water added from the surface, is then bailed out intermittently as the hole is deepened. Modifications of the technique were used for all oil wells drilled before 1900.

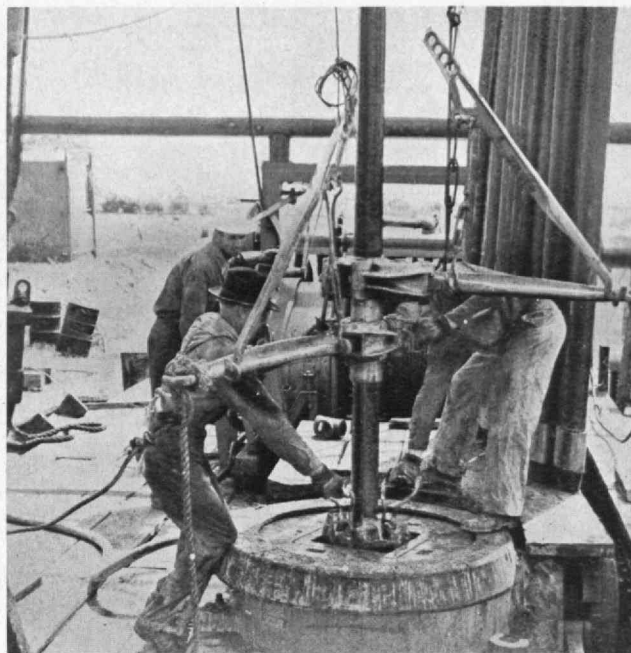
Because soft rock formations tend to cave when drilled in this way, a new method of drilling was tried in 1901 in the Spindletop field in Texas. During the following few years the new method was used extensively in many of the California fields and in Gulf Coast fields. Known as the rotary method of drilling, it combines the principle of the auger with that of hydraulic drilling.



The business end of a drilling string — a cone-type rock bit hauled out above the rotary table which drives it



Latching elevators below the drill-pipe coupling, preparatory to lifting the string. The kelly with swivel and mud hose stands in the "rathole" at the left.



Lifting the pipe slips out of the hole in the rotary table. Both pipe wrenches are on the drill-pipe couplings, ready to break out the joint.

A hard-faced bit screwed to the bottom of a string of pipe is rotated to cut or grind its way through the rock formations, and as the hole is deepened, more pipe is added to the upper end of the column. Mud pumped down inside the rotating pipe serves the fivefold purpose of washing and disintegrating the rock, cooling the bit, removing the ground-up rock by flushing it to the surface, supplying sufficient hydrostatic head to control high pressures encountered, and plastering the walls of the hole to prevent the caving in of loosely cemented beds of rock.

The method was satisfactory for soft formations, but the original drag-type, or fishtail, bits which were designed to scoop or shave small pieces of rock from the bottom of the hole could not cut their way through hard rock very rapidly. With the invention of rock bits having cogs or serrated toothed cones, this difficulty was overcome and the scope for rotary drilling was widened until today about 95 per cent of all oil-well drilling in this country is done by the rotary method.

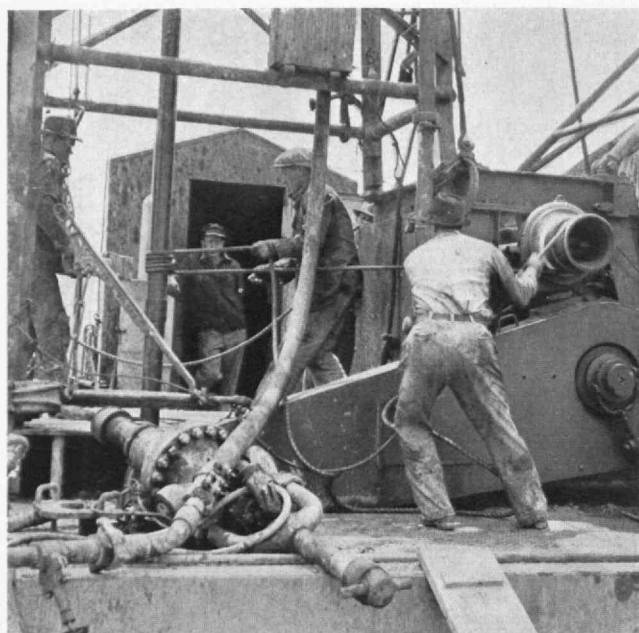
The early models of rotary-drilling outfits enabled penetration to depths of about 2,000 feet. As deeper wells were drilled, outfits were made much heavier and stronger to dig larger holes to greater depths. With the advent of proration in the late 1920's, a trend developed toward drilling smaller holes with lighter, more compact, and better balanced rigs, so that most of our rotary rigs now are smaller and more efficient than were those used in 1925 or 1926. The deepest well drilled to date reached a depth of 15,004 feet. Wells of 10,000 feet are no novelty; more than 300 of them were drilled in 1940 in the Gulf Coast area of Texas and Louisiana. The average well drilled today in Texas or Oklahoma, however, is probably about 5,000 feet deep.

In drilling a typical 5,000-foot well today, a cellar about 10 feet square and 10 feet deep is excavated at the

site of the well, and mud-storage pits are dug a few feet to one side. Four cement foundations are poured to support the legs of the derrick, which has a base 24 feet square. The derrick, constructed of galvanized angle-bars assembled with bolts, is 122 feet high, and the four sides taper to form at the top a square 5½ feet on a side. This reinforced steel tower provides support for the 6-sheave crown block which sustains the heavy strings of pipe used in drilling.

As soon as the derrick is completed, the other units of the drilling equipment may be moved in. The draw-works, or power-distributing center, is set up at one side of the base of the derrick, partly inside the derrick square and partly outside it. In addition to a hoisting-cable drum, with its brake bands, multiple gearshift, and clutches, the draw-works has several power take-off drums and a sprocket wheel operated by a multiple gearshift. A heavy roller is connected with the sprocket wheel to drive a similar sprocket on the rotary table, which, located in the middle of the derrick square, turns in a horizontal plane and has a centrally located hole which accommodates removable square-sided drive bushings. For greater safety to the drilling crew, the roller chain connecting the draw-works to the rotary table is covered with a metal guard, as is most of the draw-works machinery. The draw-works, mounted as a unit on steel skids for easier movability from well to well, weighs seven or eight tons, and the rotary table weighs about three tons.

Directly behind the draw-works and mounted as a single unit on another pair of steel skids are two 150-horsepower internal-combustion engines. Multiple V-belt drives are used to connect the engines to each other, to connect the engines to the draw-works, and to drive the heavy mud pump. Clutches permit the engaging or disconnecting of any of these units. Until the



Tightening drill pipe by the operation known as "catheading." A small portable rig is in use here.

last decade, steam engines were used almost exclusively for prime movers on deep rotary wells, but many now feel that the greater economy of internal-combustion engines in water and fuel consumption more than offsets the greater flexibility and lower initial cost of steam engines. The availability of adequate supplies of bulk butane in many oil-producing areas has led to widespread use of this fuel for internal-combustion engines. When butane is not to be had, gasoline or Diesel fuel is used.

A mud pump of the double-acting direct-displacement type is located directly behind the engines. The pump piston is about $7\frac{3}{4}$ inches in diameter and has an 18-inch stroke. Driven at about 30 to 35 revolutions a minute, the pump forces about 450 gallons of mud down the inside of the drill pipe every minute. Ascending in the annular space outside the drill pipe and bearing along its load of ground-up rock, the mud flows through a pipe beneath the derrick floor to a rotary or vibrating separator, where it assists in removal of rock cuttings. Most of the cuttings left behind, the relatively grit-free mud flows into the mud-storage pit, from which it enters the suction hose of the mud pump to make another circuit down to the bottom of the well and back again.

The drilling bit is screwed onto the bottom of heavy-walled drill pipe, which serves as a torque tube permitting the application of power at the surface while keeping the bit rotating on the bottom of the hole. A common size of drill pipe measures $4\frac{1}{2}$ inches in outside diameter, has a wall thickness of about $\frac{1}{4}$ inch, and weighs about $13\frac{3}{4}$ pounds per linear foot. For the top joint of the torque tube, a kelly joint is used in place of regular drill pipe. The kelly, which is made from alloy steel, is about 45 feet long and has a round hole running the entire length inside to allow passage of mud. On the outside, the kelly is forged to form a square $4\frac{1}{2}$ inches on a side. The removable square-sided drive bushings in the rotary table fit around the square kelly, imparting

positive rotation to the torque tube but allowing the kelly and the pendant drill pipe to move vertically downward as drilling progresses.

A swivel connection is screwed to the top of the kelly joint. The lower portion of the swivel rotates with the kelly, while the upper portion, which has a gooseneck and mud-hose connection, does not rotate. Packing between the two portions prevents leakage of high-pressure mud. Mud from the pump is piped up one side of the derrick for a distance of about 30 feet, and a heavy-duty $2\frac{1}{2}$ -inch rubber hose forms a flexible link between the mud supply line and the hose connection on the swivel, furnishing an uninterrupted flow of mud down the drill pipe as the hole is deepened. A bail on the upper, non-rotating portion of the swivel permits most of the weight of the drilling string to be suspended from a block-and-tackle system composed of a heavy, 5-sheave traveling block and a 6-sheave stationary crown-block on top of the derrick. About 2,000 feet of wire hoisting cable $1\frac{1}{8}$ inches in diameter are needed for reeving between the blocks. One end of the cable is anchored to a sill attached to the derrick foundations, and the other end, after being rove through the sheaves of the traveling block and the crown block, is fastened to the hoisting drum of the draw-works.

Most of the weight of the drilling string is supported through the block-and-tackle arrangement from the crown block of the derrick, and only enough weight bears on the cutting face of the bit to obtain proper cutting or grinding action. The removable bushings in the rotary table form a square-sided opening large enough to allow the kelly to slide through easily. Thus the turning of the rotary table by chain drive from the draw-works imparts rotation to the drill pipe and bit. To lower the bit as the hole is deepened, the brake on the hoisting drum is released and more cable is allowed to pay out through the block system. The square-sided kelly is only about 45 feet long; hence when the bit has been lowered until the swivel connection nears the rotary table, drilling is stopped, the mud-pump clutch disengaged, the hoist clutch thrown in, and the entire drilling string raised off bottom until the upper end of the top joint of drill pipe is drawn above the table. The kelly bushings are removed from the rotary table, and serrated slips are put in their place in the opening. On release of the hoist brake, the weight of the drill pipe is thus transferred to the rotary table. The kelly is unscrewed and lowered into a shallow hole at one side of the derrick; the hook of the traveling block is unlatched from the swivel bail.

The drilling crew roll a new 30-foot joint of drill pipe onto the derrick floor from the pipe rack. Elevators on the hook of the traveling block are latched beneath the coupling on the drill pipe, and the new joint is swung up by the hoist and screwed onto the drill pipe already in the hole. The hoist then picks up the load, the drilling crew remove the serrated pipe slips, and the pipe is lowered until only the top of the new joint projects through the rotary table. The slips are used again to support the drilling string from the rotary table, the elevators are unlatched, the kelly is picked up and screwed on. Kelly bushings replace the pipe slips, the mud pump is started, the bit is lowered to the bottom of the hole, and another 30 feet (*Continued on page 240*)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Alumni Day 1942

TECHNOLOGY'S tradition of holding an annual spring home-coming celebration for Alumni will be continued this year. The events which make up this celebration, however, will be abbreviated to conform to conditions of war and the limited time available to Alumni to "come back to Tech" for a few hours of fun with the good fellows who always get together on this festive occasion.

Alumni Day 1942, as recently announced by Raymond H. Blanchard, '17, general chairman, will be held on Saturday, April 25, preceding the Class of 1942 commencement ceremonies scheduled to be held on Monday, April 27. On that Saturday afternoon, representatives of the 25-year Class (1917) and of the 50-year Class (1892) will share the spotlight with the seniors in the Class Day exercises, which this year will be held in Walker Memorial.

Technology's traditional "stein-on-the-table" banquet will be held on Saturday evening at the Hotel Statler. Plans for this program are as yet incomplete, but the dinner committee promise an evening of good-fellowship comparable to previous alumni banquets. Detailed plans for the evening's program will be announced in the next issue of The Review and in a pamphlet which will be mailed with the annual alumni ballot.

Assisting Mr. Blanchard are the following men: *Class Day*: John D. Mitsch, '20, *chairman*, Charles F. Park, '92, Raymond Stevens, '17, and Eugene Mirabelli, '19. *Dinner*: Delbert W. Kendall, '24, *chairman*, Arthur L. Shaw, '09, Kenneth E. Bell, '17, Josiah D. Crosby, '21, Larcom Randall, '21, and Herbert R. Stewart, '24. *Publicity*: Ralph T. Jope, '28, *chairman*, Henry B. Kane, '24, James Donovan, '28, Robert C. Casselman, '39, Frederick G. Fasset, Jr., and John J. Rowlands. *Registration*: Donald P. Severance, '38, *chairman*, Joseph C. MacKinnon, '13, Robert M. Kimball, '33, and Wolcott A. Hokanson. *Ways and Means*: Horace S. Ford, *chairman*, Carl M. F. Peterson, '29, and Delbert L. Rhind. *Alumni Day stein*: designed by Henry B. Kane.

For Valor

ALBERT M. JONES, '13, the brigadier general who commanded the southern sector of the American front in the Luzon campaign in the Philippines, has been awarded the Distinguished Service Cross on the recommendation of General MacArthur, who cited General Jones's extraordinary heroism in action during the early phases of the Philippine invasion.

General Jones, who by particularly skillful maneuvers withdrew his command from the southern front of Luzon and joined General MacArthur's men, has seen service in the Panama Canal Zone, at the Mexican border, and

in France, where he served as a major in the infantry during the first World War. He carried on advance studies in the Army at the General Service School at Fort Benning, Ga., the Command and General Staff School at Fort Leavenworth, Kansas, and the Army War College at Washington, D. C. For a number of years he was assistant chief of staff in charge of intelligence for the Ninth Corps Area in San Francisco. One of his four sons is a member of the 503d Parachute Battalion, and another is a cadet at the United States Military Academy.

The Gymnasium Fund

SOURCE and disposition of the fund raised by Alumni, students, and friends of the Institute for the improvement of Technology's athletic facilities are shown in the following report on the M.I.T. Alumni Gymnasium Fund, as of December 31:

PLEDGES		
Number		Amount
4,939	Alumni.....	\$393,704.87
1,801	Students.....	25,023.36
199	Non-Alumni Faculty and Staff..	9,177.50
103	Other non-Alumni.....	2,741.49
7,042		<u>\$430,647.22</u>

Disposition of Pledges

Canceled and uncollected.....	\$ 24,465.01
Collected.....	406,182.21
	<u>\$430,647.22</u>

FINANCIAL SUMMARY

Funds Available

Gifts from Alumni, prior to establishment of Gymnasium Fund.....	\$ 2,850.80
Gymnasium Fund receipts.....	\$406,182.21
Less: campaign expenses.....	44,466.98
	<u>361,715.23</u>

Contribution from Class of 1923 for sun garden.....	10,000.00
Earned income.....	19,517.00
Appropriations from M.I.T.:	
1939-1940.....	\$ 30,000.00
1940-1941.....	30,000.00
To be appropriated by M.I.T.*.....	57,636.89
	<u>117,636.89</u>
	<u>\$511,719.92</u>

Funds Expended

Briggs Field House.....	\$ 95,601.70
Briggs Field and Track.....	36,467.43
Alumni Pool.....	379,650.79
	<u>\$511,719.92</u>

* Payments from unpaid pledges of \$24,465.01 may reduce this amount.

Election in Order

VOTING in the annual election of officers and representatives of Technology Alumni will soon be in order as ballots are mailed to the more than thirty thousand composing the electorate. For President of the Alumni Association, Francis A. Barrett, '24, VI, New England Telephone and Telegraph Company, Boston, has been named by the Association's National Nominating Committee, which is composed of Charles R. Main, '09, chairman; Charles A. Smith, '99; Charles P. Fiske, '14; Walter J. Beadle, '17; Stanley W. Hyde, '17; Alfred W. Hough, '19; Edward E. Scofield, '19; Winter Dean, '21; Kenneth M. Cunningham, '22; and Franklin Fricker, '25.

Nominated for Vice-president is Edwin D. Ryer, '20, VI, Barbour Stockwell Company, Cambridge; and for members of the Executive Committee the nominees

are Arthur L. Shaw, '09, I, Metcalf and Eddy, Boston; and Ezra F. Stevens, '27, XV, Raytheon Manufacturing Company, Waltham.

B. Edwin Hutchinson, '09, III, Chrysler Corporation, Detroit; Duncan R. Linsley, '22, XV, First Boston Corporation, New York; and Richard L. Bowditch, '23, XV, C. H. Sprague and Son Company, Boston, are nominated for term membership on the Institute Corporation.

Members of the National Nominating Committee are elected from districts so arranged that three or four members leave the committee each year. New representatives are to be chosen this year for Districts 3, 6, and 7, to succeed Messrs. Hough, Beadle, and Fricker. The slate from which new representatives will be chosen includes: *District 3*: Frederick D. Murdock, '13, I, Murdock Webbing Company, Pawtucket, R. I.; George E. Colby, '32, II, International Braid Company, Providence, R. I.; *District 6*: Frederick A. Hunnewell, '97, XIII, United States Coast Guard, Washington, D. C.; Greville Haslam, '15, IV, The Episcopal Academy, Overbrook, Philadelphia, Pa.; George W. Spaulding, '21, VI, Pennsylvania Water and Power Company, Baltimore, Md.; *District 7*: Dr. Lemuel D. Smith, '06, XIII, Orthopedic Surgeon, Milwaukee, Wis.; Sherry O'Brien, '17, X-A, Harvey Metal Corporation, Chicago, Ill.; John S. Raffety, '22, I, Cincinnati Metropolitan Housing Authority, Cincinnati, Ohio.

Reports and Plans

MEETING for its 224th session, the Alumni Council on the last Monday in January heard reports on action past and activity planned; memorialized Belvin T. Williston, '77; heard the importance of recent chemical developments in the present emergency described by Avery A. Morton, '24, Professor of Organic Chemistry; and witnessed a sound motion-picture showing the construction and operation of the Chrysler Corporation's tank plant.

Presiding in the absence of B. Edwin Hutchinson, '09, President of the Alumni Association, was Harold Bugbee, '20, Vice-president, who called on Raymond H. Blanchard, '17, chairman of Alumni Day 1942, for a résumé of plans, which is reported elsewhere in this issue. Henry B. Kane, '24, Director of the M.I.T. Alumni Fund, reported the progress of the Fund, pointing out that the number of contributors and amount of contributions are running ahead of last year's but that the ultimate goal of 10,000 men averaging \$15 a contribution is yet to be attained.

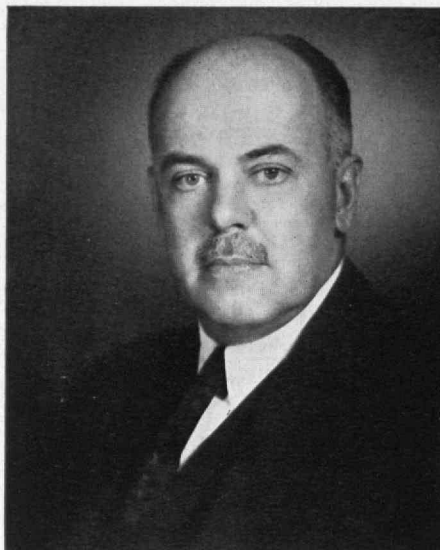
More effective employment of the energies of the Council was the objective of a detailed report by the special committee on broadened activities of the Alumni Council, presented by Alf K. Berle, '27, chairman. Seven lines of study, each to be the subject of work by a separate subcommittee, were recommended by the report, and individuals composing the subcommittees were named. The report was received with keen interest. Resolutions drafted by a committee comprising Theodore H. Taft, '01, chairman, Joseph C. Riley, '98, and Arthur L. Townsend, '13, recorded the Council's tribute to Mr. Williston, a member of the organization since 1915 and Secretary of the Class of 1877 since 1929.



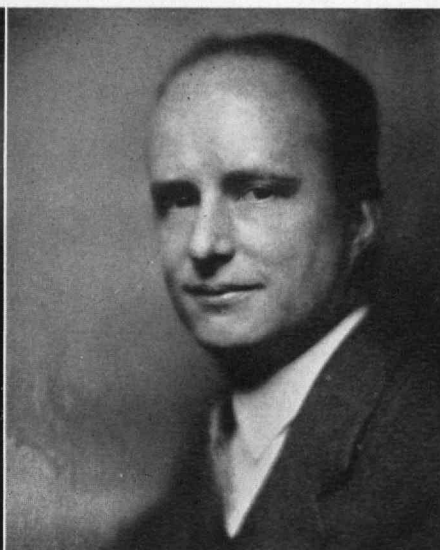
Purdy

FOR PRESIDENT

... of the Alumni Association of the M.I.T., Francis A. Barrett, '24, is the nominee chosen by the National Nominating Committee this year. Chairman of the midwinter alumni meetings in 1940 and 1941 and general chairman of Alumni Day 1940, Mr. Barrett is an active leader in alumni affairs. He is secretary of his Class and representative of his Class on the Alumni Council. Upon his graduation from the Institute, he joined the New England Telephone and Telegraph Company as an electrical engineer. After service in the plant, traffic, commercial, and engineering departments, he became advertising manager of the company in 1931 and head of its publicity department in 1935. In 1932 and 1933, Mr. Barrett served as publicity director of the Greater Boston Community Fund; he was executive manager of the fund in the next year, and treasurer and member of the budget committee for the fund of 1935. He is a member of the Advertising Club of Boston and of the Technology Club of New York.



Delph-Narfn



Pirte MacDonald



TO THE CORPORATION

... as term members, the National Nominating Committee this year has designated, from left to right, B. Edwin Hutchinson, '09, retiring President of the Alumni Association, chairman of the finance committee of the Chrysler Corporation, Detroit; Duncan R. Linsley, '22, Vice-president, director, and member of the executive committee of the First Boston Corporation, New York; and Richard L. Bouditch, '23, President of C. H. Sprague and Son Company, Boston.

Pioneer in Education

TECHNOLOGY Alumna, chemist, and home economist par excellence, Alice F. Blood, '03, is the last to retire from the group who made up the early staff of Simmons College, pioneers in the development of the first endowed professional college for women. A teacher of chemistry, she assumed the directorship of the Simmons school of home economics at a time when chemistry was beginning to be recognized as a sound basis for the study of food and nutrition. Under her guidance, the school has gained recognition throughout the country. Last June, Dr. Blood relinquished her duties as professor of nutrition and director of the school of home economics.

Although she decided to go to college only after her junior year at Lynn English High School, she had studied a good deal of mathematics and science, which especially appealed to her, and had no difficulty in entering the college of her choice — Technology. So engrossed was she in her work at the Institute that after graduation she decided to stay on as private assistant to Samuel P. Mulliken, '87. In 1904 she was chosen instructor in chemistry at Simmons, the organization of which had been modeled on M.I.T. Dr. Blood was so well suited to her work and to the needs of Simmons that, until last June, she had been prevailed upon to stay there since 1904 — with the exception of an interval which yielded her a doctorate in philosophy from Yale University in 1910 for her study of physiological chemistry under Lafayette B. Mendel.

The directorship of such a school of home economics would have been enough to keep any ordinary woman more than busy. But Alice Blood is no ordinary woman. From 1922 to 1924 she was president of the American Home Economics Association. Hers was an active administration, for during that time the business of the association was systematized, the first and second

executive secretaries were appointed, headquarters were established in Washington, and the editorship of the *Journal of Home Economics* was changed from a part-time job to a full-time position. She has found time to be a member of the American Public Health Association, the American Dietetic Association, the College Club of Boston, and Sigma Xi. She is editor of the Riverside home economics series and was a special editor of the home economics problems in the second edition of Webster's "New International Dictionary of the English Language." Her idea of a pleasant morning is to cook a big meal to be consumed by hungry nephews.

In *Home Economists*, the American Home Economics Association has characterized her as "a person of quiet reserved manner" who has "nevertheless won the high regard and affection of her associates and students. . . . Anyone who has worked with her will testify to her clear and honest thinking, her love of fair play, and will remember with gratitude the sense of humor which so frequently and sometimes unexpectedly relieves a dull moment of routine business."

Simmons' loss is New Hampton's gain, for it is to that New Hampshire town that Dr. Blood has elected to retire. There she will garden and see her friends — and "write a book if I can't help it."

Substance of Leadership

PROFESSOR ERWIN H. SCHELL, '12, Head of the Department of Business and Engineering Administration, has maintained a close relationship with his students, not only during their careers at the Institute but through the years of their advancement in business and industry. His personal letters to graduates of the Department, offering them practical wisdom upon which the satisfactions of life are founded, have long since become one of the strong bonds between the Institute and a notable group of Technology men.

From the fund of thought that prompts these letters and from his study of the qualities distinguishing men of exceptional ability, Professor Schell has drawn the material for his latest book, *New Strength for New Leadership*,* in which he discusses the need for strength, courage, and faith by those upon whom rests the responsibility for executive direction and leadership.

Technology Kin

ALUMNI find many ways of keeping in touch with Technology, and one of the most pleasant is sending their sons to the Institute. This year one daughter and 45 sons of Technology men are registered as freshmen. They are:

Student	Father
Paul N. Anderson, Jr.	Paul N. Anderson, '21
James B. Angell	Robert C. Angell, '08
Robert P. Auty	Clarence Auty, '17
Joseph S. Baker, Jr.	Joseph S. Baker, '22
Edwin S. Bell	Frank F. Bell, '10
William Bommer	Fred W. Bommer, '14
James C. Burbank	James A. Burbank, '16
Walter H. Caldwell	Frank W. Caldwell, '12
Fontinelle S. Carpenter, Jr.	F. Scott Carpenter, '20
Gordon Chun	Ki K. Chun, '20
Robert L. Devine, Jr.	Robert L. Devine, '12
Cesar A. Duran-Ballen	Sixto E. Duran-Ballen, '23
Henry B. Fabens	Andrew L. Fabens, '10
Cyrus Y. Ferris, Jr.	Cyrus Y. Ferris, '04
Arthur A. Fowle	Donald A. Fowle, '15
Frank E. Guptill, Jr.	Frank E. Guptill, '96
James L. Gurney	Harold P. Gurney, '08
John H. Hanson	Hugo H. Hanson, '12
James F. Hield	Clifford C. Hield, '10
Robert J. Horn, Jr.	Robert J. Horn, '28
Robert M. Ilfeld	Max L. Ilfeld, '24
Hubert M. Judd	M. Hubert Judd, '11
Harold A. Knapp, Jr.	Harold A. Knapp, '17
Richard A. Knight	Ralph F. Knight, '07
Arthur H. Kuljian	Harry A. Kuljian, '19
Walter I. Lang	Walter W. Lang, '12
Daniel F. Lord	Erskine D. Lord, '20
Charles P. Loucks	Milton A. Loucks, '19
William R. McEwen, Jr.	William R. McEwen, '15
Miss Frieda S. Omansky	Morris Omansky, '11
Leavitt J. Pope	Joseph Pope, '08
Lincoln D. Richardson	Lyle M. Richardson, '14
De Ross Salisbury, Jr.	De Ross Salisbury, '18
Paul E. Shea	Timothy E. Shea, '19
Roy W. Simm	Roy Simm, '09
Richard H. Smith, Jr.	Richard H. Smith, '18
Roger D. Smith	Leon H. Smith, '04
Warren M. Spear	Carlton J. Spear, '16
George H. Stebbins, Jr.	George H. Stebbins, '17
Richard A. Stetson	James A. Stetson, '99 (deceased)
David A. Stone	Leonard Stone, '16
Frederick B. Sylvander	Roy C. Sylvander, '17
David W. Taylor	Merritt H. Taylor, '20
Henry C. Tillson	Percy E. Tillson, '06
Stewart A. Washburn	Charles P. Washburn, '15
George A. Wilson, Jr.	George A. Wilson, '20

Co-operation

DARD HUNTER, curator of the Dard Hunter Paper Museum at the Institute, has volunteered his services as a technical consultant to the American Committee in Aid of Chinese Industrial Cooperatives and will assist papermaking research being conducted at Kiangsi,

* New York: Harper, 1942. Pp. xiv + 137. \$2.00.

China, with the aid of American funds. David Leacock, technical director of Indusco, Inc., making the announcement, said that the committee is a member agency of United China Relief, Inc., and supports more than two thousand vest-pocket workshops in China.

Recognized as the world's outstanding authority on the art and evolution of papermaking, Dr. Hunter has made six trips to the Far East to study methods of native handicraft papermaking. He is the author of several notable books on different techniques of papermaking used in China, India, Thailand, and Japan. These books are part of a series of fifteen covering the history of the art of papermaking in every major paper-producing country. As a consultant to Indusco, Dr. Hunter will study samples and reports now being sent from China and will suggest methods of improvement in papermaking, which is being carried on with primitive tools and methods employed centuries ago. The co-operatives, Mr. Leacock said, are anxious to foster modern production of domestic newsprint, writing paper, and cigarette paper, since importation of these papers has been cut off by Japanese control of the coastal areas.

Dr. Hunter is the only person in North America making paper by hand. Three of his books, now in the Smithsonian Institution, were the first books on the history of printing manufactured in their entirety by one man. Research, text, paper, ink, type, and printing were by Dr. Hunter.

From 1903 to 1910, Dr. Hunter, as art director of Elbert Hubbard's Roycroft Shop, guided nearly two hundred books of his own designing through the Roycroft press. Following this connection, he began his monumental research and experimentation in the art of papermaking which won him the gold medal of the American Institute of Graphic Arts in 1931.

At the invitation of Technology, Dr. Hunter in 1939 established the first museum of papermaking in the United States. Exhibits include a collection of tools used for papermaking in England in early days, specimens of early Chinese paper antedating Marco Polo's travels in the Orient, and an ancient paper mill which Dr. Hunter found in Wiltshire, England.

Visiting Committee Report

NEXT in The Review's series of condensations of Visiting Committee Reports is that for the Department of Modern Languages, which follows:

A meeting of the Committee† was held on March 12, 1941. Robert G. Caldwell, Dean of Humanities, was present through the entire meeting, and the members of the Department attended the greater part of the discussion.

Although distance prevented Albert L. Guérard, professor of general literature at Stanford University, from being present, the Department had had the benefit of several classroom visits from him in the latter part of 1939-1940, when he spent some weeks in Cambridge. At that time he also held a number of conferences with

† The members of this Committee for 1940-1941 were Donald G. Robbins, '07, Chairman, William H. Coburn, '11, J. Stuart Crandall, '27, John E. Aldred, Walter F. Downey, Albert L. Guérard, and Taylor Starck.

Dean Caldwell and Ernest F. Langley, Head of the Department. A letter from Professor Guérard, reviewing the place filled by the Department of Modern Languages at Technology and commenting favorably on its performance, was received for presentation at the meeting.

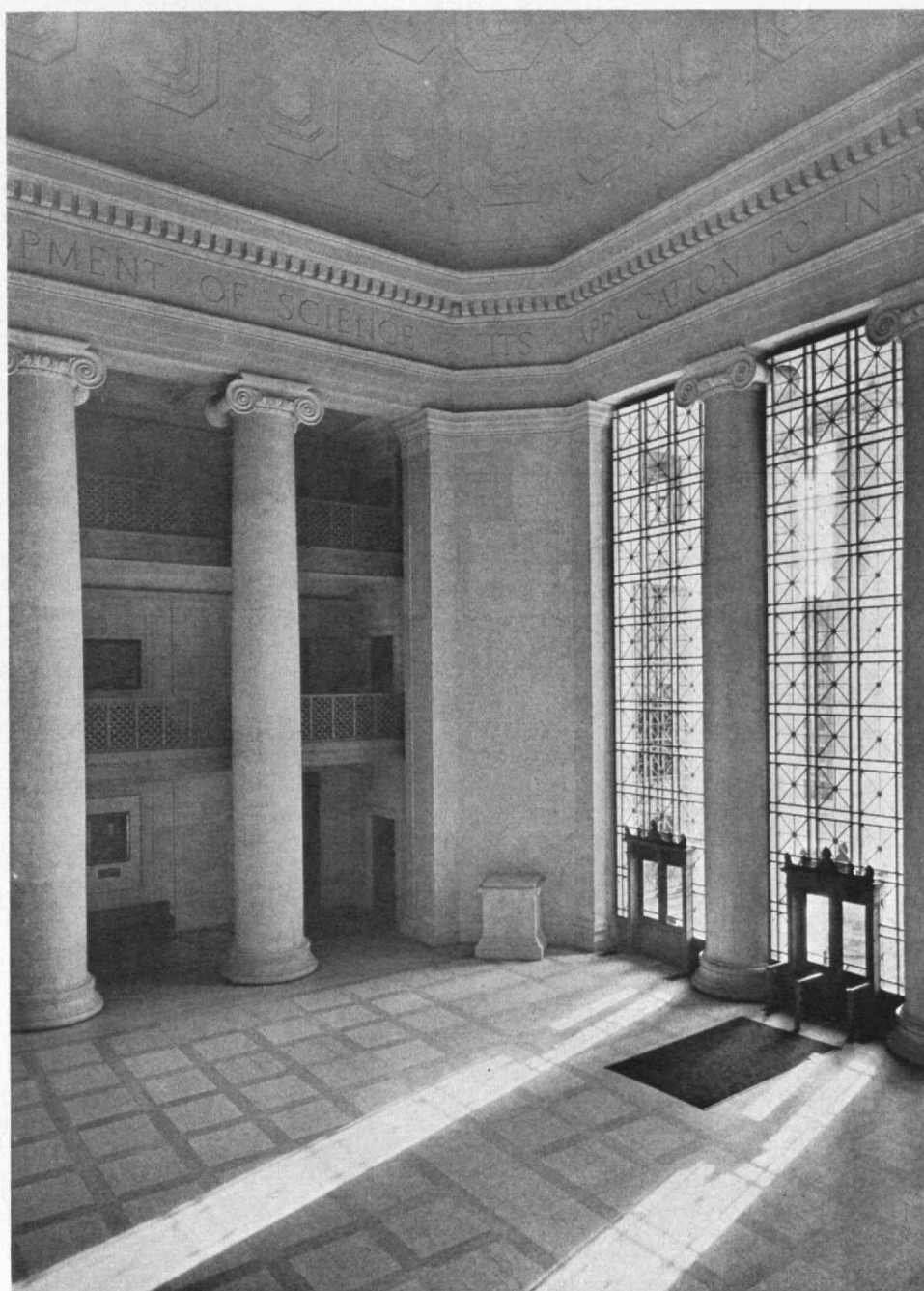
Two particular language needs exist at M.I.T.: the ability to read technical and scientific material in foreign languages, and the desirability of a knowledge of one or more foreign languages as part of the broad intellectual training of the engineer or scientist as an educated man rather than as a mere technician. The latter need may be divided, first, into the more purely cultural phase emphasizing the values contributed by a knowledge of a foreign language as a basis for building a better understanding of the literature, customs, and methods of thought of people of other nationalities; and, second, into the phase which has a practical side in emphasizing language as a means to the end of easier conduct of business or profession with people of other nationalities.

Discussion of the language requirements of the professional Courses and of the studies given by the Department of Modern Languages indicated that sharp dividing lines between technical and cultural purposes do not seem to exist and that the needs are best served by language courses that recognize both purposes. The basic elements of language structure and grammar are necessary in any case, and attainment of a reading vocabulary may well be based on both general and technical reading. Such fundamental steps in acquiring language facility are but means to the end of the broader intellectual outlook that contact with the content of that language would give, whether the content be technical, literary, or social.

The report of the Committee two years ago emphasized the difference in the language requirements of the various professional Courses. Further discussion at last year's meeting brought out the fact that wide differences exist among the professional Courses in respect to the percentage of time allotted to the humanities, reflecting the pressure of the professional point of view

to fill the maximum percentage of the curriculum with technical and professional subjects. As M.I.T., in the words of the catalogue, "trains for life and for citizenship, as well as for a career," the Committee felt strongly that adequate time should be allotted to the humanities in all professional Courses to avoid a too one-sided training of students as mere technicians. The Committee felt also that in the able hands of the Dean of Humanities, in consultation with the Heads of the other Courses, an improved balance of time between the professional and the nonprofessional phases could well be worked out.

Within a more uniform time allotment for the humanities as a whole, the place of (Concluded on page 246)



Paul J. Woolf

... For Development of Science . . . Its Application to Industry . . . Keynotes from the Institute's objectives are emphasized in this photograph of the lobby of the Rogers Building.

ON THE CHEMISTRY OF WAR

(Continued from page 217)

period of four to six months, she managed by the end of 1919 to reach a production of 165 tons of a fairly good grade of synthetic rubber each month.

In general, America lagged behind in this effort, chiefly because no immediate economic advantage was to be gained from the synthetic material. Nevertheless, the first commercially successful process was the work of chemists in this country who developed the special rubber, neoprene. Although more expensive than the natural variety, this material had qualities which made it valuable. Another rubberlike product, Thiokol, was made from sulphur and alkylene dichlorides, and because of its resistance to oil proved to be more valuable than natural rubber. More recently, butyl rubber had received considerable attention, but the commercial value of this polymer is still to be demonstrated. Under the urge for self-sufficiency, the German chemists did succeed in developing the Buna line of rubbers, which proved very satisfactory. This type of product is in fact the one that will be produced by many of the new plants to be erected during the emergency.

Synthetic rubber is claimed by many to be superior to the natural product, by others to be no improvement. Irrespective of the merits of the present argument, the synthetic variety is here to stay. It will eventually be far superior to the natural grade because chemists will be able to control the direction of polymerization and to make special blendings during preparation. The needs of the day will stimulate a small army of chemists to achieve great results. The penalty of war will fall in both camps: The Germans will again lose because their painstaking development of the Buna rubbers will be taken over by this country in the same way that their dye industry was acquired. The Dutch and English will lose because the plantation rubber will eventually give way to the synthetic variety. The change will probably not be complete until some time after the war, but all signs point to the certainty of that final result. The majority of Americans will wait hopefully for that day, but even the rapid pace of war development will not relieve the individual worry over tires.

A penalty which Japan will impose upon herself is the hastening of the change from natural to synthetic silk. The public at large has been only slightly affected by the present shortage of silk. The excellent research which has been in progress for many years on fibers of all kinds — rayon, cotton, and wool — has made many of these materials very acceptable to the trade. Moreover, the synthetic fiber, nylon, resembles silk and in many ways is superior to it. The researches which paved the way to a knowledge of nylon are now considered a classic. The construction and commercial operation of the plant are a tribute to the talent of the American chemist and engineer. The work, however, represents but a beginning, and many years might have been required to progress to a point where the natural product could no longer compete. The change will be greatly accelerated by the war. The financial ruin of Japan, now seemingly inevitable, might have been forestalled by intelligent effort on scientific but peaceful lines.

Study of the chemistry of vitamins originated in this country but has become world wide in scope. This problem, particularly that of vitamin A, bids fair to become very important to the general health because the Norwegian and Japanese fish oils have been cut off. At the present outlook, the situation may possibly be met in one of two ways — either by recovery from low-grade oils or by development of a synthetic product. The changes in national economy which the solution of this difficulty may cause will be interesting to observe.

Another problem which has been accelerated by the war is the production of aromatic compounds from petroleum. The specific one of these compounds required for war is, of course, toluene — the base for TNT. The problem of the availability of toluene had its origin in the last war, when this country suddenly discovered that its supply of this essential material was limited. Effort at that time was concentrated on the recovery of toluene as one of the by-products of the coking of coal, but a way to tap the potentially large quantities obtainable from petroleum was also sought. Two methods have since been worked out in detail. The first provides for the extraction of toluene from gasoline. Units each producing two million gallons annually and requiring four months to construct have already been built. The second method catalytically converts a petroleum fraction into toluene in a 75 per cent yield for a single passage. A plant costing a little over \$12,500,000 required a day under a year for construction. This one unit, under government sponsorship and private operation, will produce more toluene than the combined output of all the coke ovens of this country at the time of the last war. The opening of this toluene plant was quickly followed by an increase of 111 per cent in the TNT production last November.

The afterwar effect of this development will be competition between the petroleum chemicals and the by-products from the coke industry, because not only will toluene become plentiful but benzene and many other chemicals essential to the manufacture of dyes and allied materials will also be made available. Had this development happened elsewhere or had this country been short in petroleum resources, the effect on our industrial life might have proved to be very severe. Internal readjustments will, of course, have to be made. Part of the increased supply of aromatic chemicals will undoubtedly be absorbed by the growing synthetic resin industry.

These illustrations show that scientific and technological developments may produce changes which do far more to the loser or even to the winner than is apparent at the peace table. The military object of an aggressor nation is to acquire territory or specific rights. The value of either may be nullified by scientific discoveries. Should the aggressor nation be the loser, it usually not only has failed to achieve its goal but has initiated or sped up the search for substitutes for its most important products. Particularly is this condition true if the ordinary trade routes are closed. The net result is financial disaster over and above that created by the war itself.

The position of the United States in the present war is very fortunate in a chemical way. We have important raw materials within our own *(Concluded on page 234)*

**More aluminum up there, less in new telephones
—for victory!**

Many materials used in telephone making are listed as "critical" for war purposes. Bell Telephone Laboratories and Western Electric have redesigned apparatus and changed manufacturing methods to employ available materials.

Take aluminum. The reduction in its use in a year's telephone output is enough to build 294 combat planes. This program has been replacing critical materials at an annual rate of 7,747,000 pounds. Though it grows steadily more difficult to maintain as shortages increase, the program helps to meet the greatest demand in history for military and civilian communication equipment.

"THOSE PLANES WILL HELP
DADDY LICK 'EM!"

Western Electric ... is back of your
Bell Telephone service



Hevi Duty Electric Co.

Electric Furnaces

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Hevi Duty Precision Electric Heat Treating Furnaces are built in a large variety of types and sizes — for many heat treating operations — with temperature ranges to 2500° F. (1371° C.). They are standard production equipment in many national industrial plants.

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ON THE CHEMISTRY OF WAR

(Concluded from page 232)

borders. We have a great body of scientists who are capable of exploiting these materials to advantage. We have built up the greatest organic-chemical industry in the world. As a result of a series of brilliant researches, we have an abundance of the finest gasoline in the world. The 100 per cent octane rating of our material represents a 25 per cent advantage in airplane engine power over the 90 per cent rating of the best Axis grade of gasoline. Even better grades are in store.

All these and other advantages will aid materially in winning the war if they are directed primarily to that end. They are in no sense, however, an impregnable protection. Maintenance of our enviable position for the present rests, in part at least, upon the winning of this conflict. For the future, however, it rests upon our own efforts to continue scientific advancement in new fields. The recent efforts of the government to promote research on the chemistry of agricultural products by establishing regional research laboratories are a step in the direction of utilizing another great natural resource and are therefore partial insurance against the day when some of our other resources decrease in abundance or meet the results of scientific research. Finally, maintenance of our position depends upon a continuance of the research and technological work in progress in educational and industrial laboratories.

AIDE IN AERODROMICS

(Continued from page 220)

the time — and started on the other details from scratch. He ended up two years later with a five-cylinder fixed-radial water-cooled engine that developed a continuous 52.4 horsepower at a weight of about 125 pounds — a respectable accomplishment even today. On several occasions the engine ran continuously at full power on a dynamometer for ten hours at a stretch — this at a time when the best automobiles would run only a few miles without a breakdown. It was no fault of the engine that the aerodrome failed to fly. The mechanical difficulties that Manly had to overcome were enough to give pause to an older and more experienced man.

Mechanical troubles were not the only ones that made the going rough in the infant science of aerodromics. On November 27, 1899, Manly laid a complaint before his boss:

MEMORANDUM FOR THE SECRETARY:

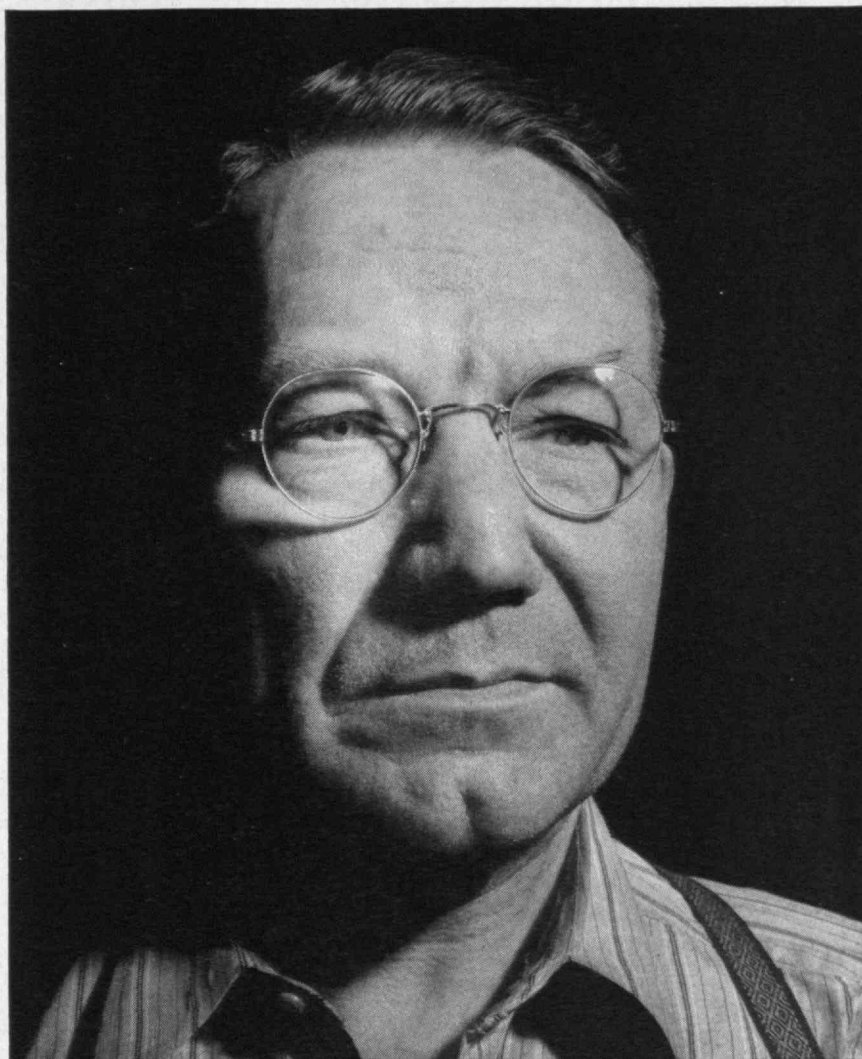
The upper room of the South Shed is at the present moment almost uninhabitable on account of the foul odors arising from the taxidermist's shop on the lower floor.

Cannot some order be given to prevent the occurrence of this again?

Respectfully,

CHARLES M. MANLY

The full account of the painstaking step-by-step path that led from the noisome shop in the "south shed" to the final plunge into the icy Potomac in the late afternoon of December 8, 1903, is too long for retelling here. Langley and Manly did it full (Continued on page 236)



VETERAN

HE IS independent and proud, yet democratic and friendly. He is the envy of the rest of the world, and its hope. He is generous and tolerant and peace-loving—and withal the most powerful man in the world. He is the American workman.

His hands, accustomed to the feel of wrench and lever and gauge, may never have held a gun; his mind, trained to think in terms of tolerances as fine as 1/10,000 of an inch, may never have wrestled with a problem of military strategy; and yet he is the veteran of a thousand campaigns.

His campaigns began in the laboratories, and his prowess was proved in the test pits of American industry. His battles were waged on the factory floor and in the field. His victories have helped to make the citizens of the United States the most

fortunate people in the world, and the U. S. the greatest nation on earth.

In the plants of the General Electric Company, working with General Electric scientists and engineers, this man, the American workman, has made giant generators to light whole cities, X-ray tubes to penetrate the mysteries of human flesh and metal castings, radio and television apparatus to project man's voice and image through space over the mysterious waves of the ether.

Today, in the gravest hour of world history, he is engaged in the greatest campaign of all. But there is serenity and confidence in his face, and the experience of a thousand campaigns behind him. He is sure of his own abilities, certain of his country's future. General Electric Company, Schenectady, N. Y.

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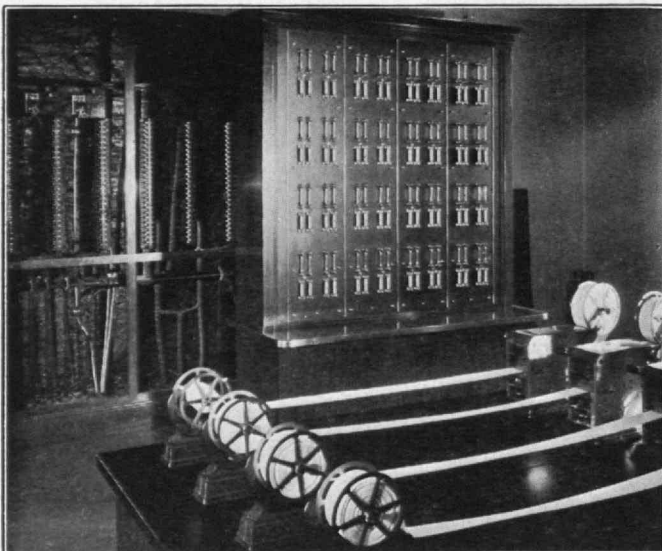
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because of their dependability
were used on this
fire alarm equipment

Simplex Wire & Cable Co.
79 Sidney St., Cambridge, Mass.

AIDE IN AERODROMICS

(Continued from page 234)

justice in the *Memoir*. It was a process that required plenty of gumption—and, at its climax, plenty of courage.

Charles Manly had the particular brand of courage needed. He realized perfectly well the risks he took in volunteering to fly the Langley aerodrome. As early as June 1, 1901, he had written a confidential memorandum to Dr. Langley:

Referring to the several conversations which we have had during the past two years or more regarding the question of who will be the aeronaut to accompany the large aerodrome in its coming field trials, I beg leave to say that I am now, as I have been at all times during the past two years, ready to occupy this position.

Having most closely observed the trials during the summer of 1899 of the model aerodromes Nos. 5 & 6, I fully recognize the danger to which I should be subjected in such experiments in free flight and I desire to assure you that in accepting such a position I do so entirely at my own suggestion and of my own free will and accord, and I beg that you will permit me to express to you my great appreciation of the very kind interest which you have shown in pointing out not only the risk to the interest of the work which such an undertaking on my part would imply, but also the personal danger to which I would be subjected.

On several occasions, Manly suggested to Langley that they should abandon the houseboat catapult, mount the aerodrome on wheels, and test it by making preliminary hops from some level piece of ground. But Langley would consider no alternatives. Although Manly's engineering judgment rebelled at the notion of launching an untried flying machine into full flight from a catapult, he did not hesitate to make the trial when the time came.

After the successful flights of a quarter-scale model early in 1903, there is no doubt that Manly shared Langley's belief that the big machine could be launched and would fly. The failure of October 7, 1903, however, might have been enough to shake any man's convictions. It was certainly enough to shake most men's courage. But without hesitation Manly climbed back into the machine in the afternoon of December 8. The weather was stormy, it was almost dark, and the Potomac River was full of floating ice. Yet time was pressing, money was running out, and some proof of success was needed to stem a rising tide of public ridicule. Manly himself made the decision for the test. Langley was not even present. As is well known, Manly (*Concluded on page 238*)

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"I never dreamed a woman's metal vanity case could help win the war, until I went to get the gorgeous new Volupte model I'd set my heart on. Now the jewelry manufacturers like Volupte are making metal cases for the kind of powder that goes 'bang'. So I don't have just the compact I wanted. But I do have the pleasure of knowing there's a kind of personal token from me now on its way to Japan."

Making the grim munitions of war in addition to fine jewelry is a real manufacturing achievement. Yet so efficiently have Volupte and others overcome the new problems, that the jewelry industry is now one of the mainstays of our armed forces. In cooperation with the Revere

Technical Advisory staff, Volupte and others have found the path to munitions made smoother, easier, quicker. This is the type of service, beyond the supplying of sound copper alloys, which Revere brings to industry generally.

So vital are copper and brass that every ounce goes directly into war materials. Fortunately, in spite of the difficulties of past years, Revere built new plants, installed better equipment, improved processes. This program, begun in 1937, has enabled us to go straight into production of essentials in modern warfare. Yet until the day of victory Revere will never rest. More plants are already being built to serve us all.



The Revere Technical Advisory Service functions in (1) developing new and better Revere materials to meet active or anticipated demands; (2) supplying specific and detailed knowledge of the properties of engineering and construction materials; (3) continuously observing developments of science and engineering for their utilization in production methods and equipment; (4) helping industrial executives make use of data thus developed. This service is available to you, free.

REVERE COPPER AND BRASS INCORPORATED

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK

AIDE IN AERODROMICS

(Concluded from page 236)

almost lost his life on that occasion. He was dragged under the water in the wreckage and succeeded only with great difficulty in freeing himself from the tangle of wires and fabric that surrounded him. When he did break loose, he came to the surface only to find himself underneath ice. Had he not found a break very quickly, his career might easily have ended at that point. But to read his own account in the *Memoir*, one would think that such events were of everyday occurrence.

The crash of the aerodrome on December 8, 1903, brought Manly's work with the Smithsonian shortly to a close. Money was exhausted. The blaze of public ridicule that accompanied the final failure was dimmed only by the successful work of the Wright brothers in the years immediately following.

Early in the fall of 1905, a curious incident occurred which linked the names of Wright and Manly. That year the Wright brothers were making real progress with their flying from their cow-pasture base at Simms Station, near Dayton. They were not avoiding publicity, neither were they seeking it. One day they had a mysterious visitor, a young man who said only that he was a writer of sorts and who did not further identify himself. The Wrights were busy about their machine and paid him scant attention. Later, according to Fred C. Kelly, Orville Wright recognized their visitor in a magazine picture as "Charles M. Manly, chief mechanic for Professor Langley of the Smithsonian Institution."* The implication was that Manly had been caught "snooping."

Whoever the visitor, plenty of evidence is available that it was not Charles Manly. In the first place, it would have been entirely out of character for him to visit the Wrights surreptitiously. He had great admiration for their work, and at that time the relations between the Wrights and the Secretary of the Smithsonian were entirely friendly. The famous feud that finally led to the shipping of the original Wright machine to the South Kensington museum in London did not break out until many years later. Moreover, Manly had left Langley's employ some months before the alleged visit, and no evidence exists of any verbal or written report to Langley giving firsthand observations of the Wright brothers' flights. Further, none of Manly's associates or employees of the time remembers any visit to Dayton. Whether he could have afforded the trip is extremely doubtful, as he was then borrowing money to meet the small pay roll of the struggling Manly Drive Company.

The records of the Wrights themselves clinch the argument. They recollected clearly that their visitor had no mustache at all, or that it was "very close-cut." The fact is that before, during, and after autumn of 1905 Charles Manly wore a magnificent "handle-bar" mustache of a definitely dark color. Ample photographic evidence is extant on that score. Someone erred. The Dayton "snooper" was certainly not the ex-aide in aerodromics.

In the course of his work with Langley, Manly had hit upon the idea that was afterwards to occupy much of his energies — a hydraulic drive, which he later patented and marketed. In 1905 he formed the Manly Drive Company, which was active until 1915. His hydraulic drive was successfully applied to certain automotive trucks between 1905 and 1916. A few installations were made on naval vessels, notably two battleships for the Argentine Navy. At the time of his death he held some fifty-odd patents on hydraulic machinery, patents that yielded him a considerable return in royalties. Although he was never a wealthy man, his work did net him a comfortable living during the latter years of his life.

During World War I, Manly again came into close contact with aviation. In 1915 he became associated with the British War Office as a consultant. He was sent over to Canada in order to help straighten out a design for a twin-engine bomber that was being built for the Canadian Curtiss interests. Afterwards he became a consultant for the Curtiss Aeroplane and Motor Corporation and was sent to England by Glenn Curtiss to correct certain difficulties that developed on Curtiss equipment abroad. On his return, he was made chief engineering inspector at the Buffalo plant. His connection with the Curtiss company ended in 1920. Then, with C. B. Veal (now of the Society of Automotive Engineers) as partner, he set up shop as an independent engineering consultant in New York City, an occupation that kept him busy until his death.

As a natural corollary of his engineering and mechanical instincts, the desirability of standardizing as many mechanical elements as possible had great appeal for him. During his work in the first World War, he saw many glaring examples of wastefulness and confusion resulting from lack of standardization. To have a dozen or more *almost* identical "bits and pieces" where one might do, simply made no sense to Charles Manly. Because of this interest, he was appointed a member of the United States commission to the International Aircraft Standards Conference held in London during February and March of 1918. After the war he devoted a considerable part of his time and energy to the aircraft and automotive standards work of the Society of Automotive Engineers. (He was president of that organization in 1919.) What progress has been made in the direction of standardization of parts stemmed largely from his interest in the problem.

All his life Charles Manly was more of an engineer than a theorist. His scientific and mathematical training was perfectly sound, but he achieved less by brilliant processes of intuition and abstract analysis than by the application of sound common sense and concentrated effort. He sat up nights with his problems, but when he got answers they were right. He had the courage of his convictions. He made few snap judgments. He worked hard and had confidence in his results. He expressed his findings in definite and understandable engineering terms. Such things should be the goal of any engineering graduate, young or old. They can be achieved, even if it is denied most of us to start our careers on such a curious bypath as the science of aerodromics.

* "They Wouldn't Believe the Wrights Had Flown," *Harper's Magazine*, 181: 290 (August, 1940).



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HE'S IN CLASS 3-A . . . deferred from army service for family service. *Pigtails and pinafores are still just as important as Panzer divisions!* While fighting power is essential, the loving care and education of American children are also vital to the nation's future.

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They'll be glad to give you good advice—and modern equipment that will carry you through your *personal* war against want and fear. New England Mutual has helped other fathers in other wars for more than a century.

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Arthur C. Kenison, '19,
Boston

Blaylock Atherton, '24,
Nashua

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WELLS OF POWER

(Continued from page 226)

are drilled. Then the process is repeated, another joint being added. When a dull bit is replaced, all the drill pipe must be removed from the well. The process is very nearly the reverse of that used to add a new joint of drill pipe, except that instead of being taken apart a single joint at a time and then laid down on the derrick floor, the pipe is unscrewed at every third joint and the 90-foot lengths of pipe are left standing in the derrick. When the dull bit is brought to the surface on the last joint of pipe, it is unscrewed and a sharp one replaces it. Then the pipe is run back in the hole three joints at a time until the new bit reaches bottom.

Although the walls of the hole are not apt to cave much while drilling is being done by the rotary method, it is considered good practice to run several strings of casing in each well so that sediments too many feet thick are not exposed at any one time. In a well of this depth, the hole would probably be started with a bit 18 inches in diameter, and hole of this diameter would be cut about 800 feet deep. Eight hundred feet of casing 13 $\frac{3}{8}$ inches wide would then be set and cemented to prevent caving of surface material into the hole. A bit 12 inches in diameter would be run inside this casing to a depth of possibly 3,000 feet, and 3,000 feet of 9-inch-diameter casing would be cemented to keep the formations from 800 to 3,000 feet deep from caving into the hole. Then a 7 $\frac{7}{8}$ -inch bit would be run inside the 9-inch casing, and hole would be drilled to the top of the oil sand at about 4,950 feet; thereupon 4,950 feet of 7-inch-diameter casing would be cemented to keep formations from 3,000 to 4,950 feet from caving into the hole. Finally, a 6-inch bit run inside the 7-inch casing would drill the hole into the oil sand, allowing oil to be produced at the surface through the 7-inch casing.

There is an old saying among rotary drillers that you are making money only when the bit is on bottom and turning to the right. The deeper the hole, the larger proportion of time must be spent pulling all the pipe in three-joint sections and running it all back in the hole to change drilling bits. For years our best drilling engineers have been striving to lower drilling costs by increasing the proportion of time which must be spent in actual drilling.

Pipe hoisting speeds have been stepped up but seem to have reached the maximum consistent with safe operating conditions for the workmen, using existing equipment. Drill-pipe joints have been improved to permit more rapid stabbing and screwing together. Enormous improvements have been made in hard facing alloys to increase effective wear on bit surfaces. Likewise, minor changes in the design of bits and drill pipe have often greatly prolonged the useful life of bits and lowered total drilling time. Only a few years ago, the average footage drilled per bit was only 50 to 150 feet; now it is not very rare for 1,000 feet of hole to be drilled without any change of bits. Not only has footage per bit increased, but speed of digging has increased in the last ten years from an average of about 5 feet an hour to about 50 feet an hour. Drilling costs have been halved in the same period of time. (Concluded on page 242)

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The FIDELITY Sinfra Triple-Head Wire Covering Machine—three knitting heads in series knits three cotton coverings on wire up to #6 gauge—1200 to 1500 feet per hour—speeds production—low power consumption.

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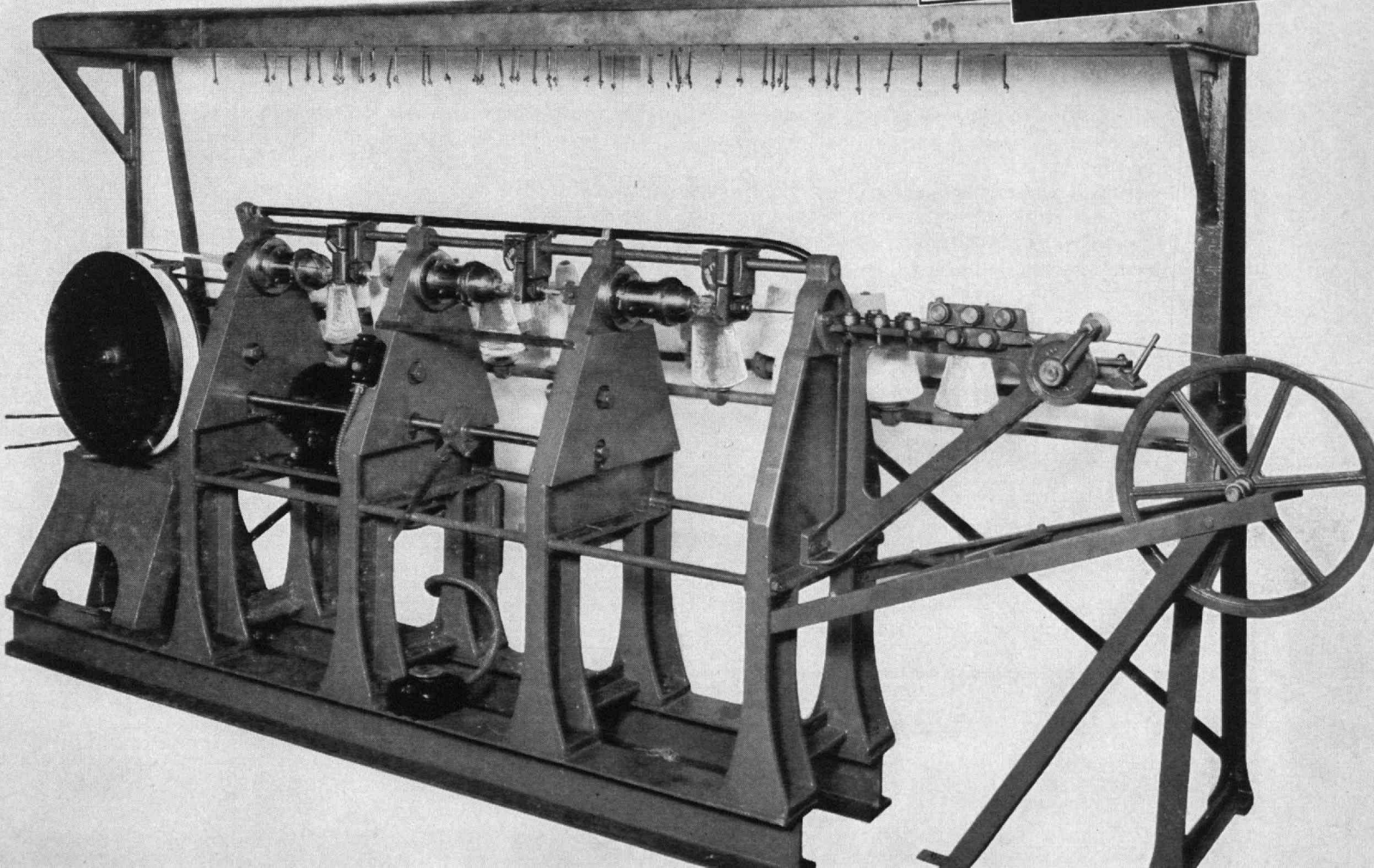
Automatic electric stop-motion for each yarn—improved knitting head and needle design eases removal and replacement—knitting direct from large cones eliminates small package winding—and quiet operation reduces operator fatigue.

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SPECIFICATIONS FIDELITY Sinfra Triple-Head Wire Covering Machine	
No. Covers Knitted	3
Rate of Production	1200'—1500' per hour
Size of Wire Covered	Up to #6 Gauge Bare Copper Wire
Power	1 H.P.
Floor Space (Knitting Unit)	12' x 4'
Haul-off Reel Capacity	Max. 1000 lb. Max. 40" O.D.— 40" Traverse
Yarn	Knit Directly from Large Cones



WELLS OF POWER

(Concluded from page 240)

Field conditions differ so widely and so many unforeseen things may occur in drilling a deep well that cost figures may be cited only with extreme caution. Some completely equipped producing wells are being drilled to depths of 5,000 feet for less than \$15,000, but the average cost even under favorable conditions is probably between \$20,000 and \$40,000 per well.

Most of the improvements in faster, safer, and cheaper drilling achieved in the last two decades are directly attributable to the technically trained engineers employed by the oil companies. Although the record of progress along this line is impressive, much more still remains to be done. As our production for war moves into high gear, the petroleum industry needs an even greater number of technically trained men to enable us to provide still more fuel for our armed forces in the air, at sea, and overseas.

FOOD FOR BRITAIN

(Continued from page 223)

they are to serve. These grids will be able to feed the people even after the Rest Centers, the British Restaurants, and the Emergency Meal Centers are put out of action. One grid can produce 6,000 meals in a four-hour period and send them into town by mobile canteen.

About twenty-one months ago, the Ministry of Food launched a nutrition campaign for British housewives. Demonstrations and displays have been widely distributed, with the co-operation of the British Board of Education and local authorities. Talks and lectures to home economists, canteen managers, welfare workers, and the like, have been successful. The campaign is now to be extended to housewives in their homes by lessons and advice on new and attractive ways to use rationed foods. In each of eighteen districts of England and Wales is a team of four persons trained in domestic science. They co-operate with the women's organizations and societies, arrange demonstrations and talks in all districts. One supervisor in the team plans a Food Center, with utensils and recipes, to appeal to the average homemaker. Demonstrators help with information on current food prices, local food conditions, and rations, and supply recipes to develop the culinary art. Thus the government is helping the housewife.

The problem of bread improvement has incited much controversy in Britain. Shall it be whole-meal bread or enriched bread, and what ingredients shall be used? On the advice of the Medical Research Council, the production of a "government" loaf of bread of 85 per cent extraction (that is, containing 85 per cent of the wheat berry instead of the usual 73 per cent) has been ordered. The view was held that such a bread retains as much of the B vitamins and protein as possible without including objectionable amounts of indigestible bran. The war-time diet already contains much vegetable food with large amounts of roughage. The protein in the outer part of the wheat berry is superior to that in the endosperm.

The council also recommended the addition of thiamine and calcium to flour. The suggestion was made that calcium be added as the carbonate to the extent of seven ounces to the 280-pound sack of 73 per cent white flour, and fourteen ounces to the sack of 85 per cent extraction flour. The extra calcium is added to the less refined flour in order to neutralize the effect of the extra phytic acid in this flour, for phytic acid is thought to be the cause of the rachitogenic effect of cereals.

Certain local committees in England have urged 100 per cent wheat meal, on the basis that the removal of any constituent from wheat will disturb the balance of its nutrients and that the addition of calcium carbonate will provoke new problems. The committees quote Leviticus, "And when I have broken the staff of your bread . . . ye shall eat, and not be satisfied."

The bread improvement program has been retarded because 85 per cent extraction flour requires an alteration in milling machinery, because enrichment with thiamine necessitates the importation of very large supplies of this vitamin from America and sufficient stocks have not been available, and because conservative physicians in Britain have raised the scare that the addition of "chalk" may produce dire abnormalities. In the end, whatever the method, Britain as well as America will have a much better bread.

Before the war, Britain imported about 70 per cent of her foods. She was a manufacturing nation. It is said that four-fifths of the breadstuffs, four-fifths of the fruit, one-half of the meat, eggs, and dairy products, and one-third of the fish and vegetables were grown off the island before 1939. Though Britain has increased her food production by putting 4,000,000 additional acres under cultivation, she must still import 40 per cent of her foods if she is to keep alive. (Concluded on page 244)

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FOOD FOR BRITAIN

(Concluded from page 242)

In feeding a garrisoned nation such as Britain, we should send over those foods with the highest nutritive qualities per cubic foot of shipping space, with special emphasis on proteins and vitamins and not on calories as in the last war. A large amount of dried fruits (chiefly raisins and prunes) has been sent to England. They are valuable largely for their sweetness and do not represent a good selection of foodstuffs except for psychological hunger. Dried beans and peas fall in the same category.

Unfortunately, dried vegetables have but little place in the current picture, because we in this country have neither the adequate knowledge nor the proper equipment to produce quantities of these dehydrated foods and still retain high flavor, quality, stability, and vitamin content. America should and can learn to dehydrate foods properly. Our Department of Agriculture has commenced scientific investigations on this subject, using an appropriation of \$144,000 from the Lend-Lease Law. Early activity was to survey existing plants where tunnel drying could be done. There are other more attractive methods which need investigation, however, and research is badly needed. The shortage in refrigerated ships makes impossible the shipping of fresh vegetables. Even so, sending such foods would be foolhardy, since the nutrition per cubic foot of shipping space is relatively low.

That the British dietary is running low in ascorbic acid content is due to the facts that no food source rich in vitamin C exists which is not fragile or bulky, and that citrus fruits and tomatoes are at a premium. In all probability, the dietary during the summer of 1941 was adequate in ascorbic acid but during the present winter it has again become deficient. Large shipments of canned citrus juices and tomatoes have been sent to Britain. These first shipments were used to feed young children, men on naval vessels (submarines and destroyers especially), and certain classes of miners and steelworkers who have a craving for canned tomatoes.

Students of nutrition must guard against an over-scientific attitude toward foods. An orange is not only a source of carbohydrates, minerals, and vitamins; it is also a glorious thing to behold, a fragrant thing to smell. The psychology of feeding can never be ignored, for it contributes to appetite, morale, and happiness. Nor can one deal too violently with the food habits of a mass of people without risking discontent — especially when a population is garrisoned under the depressing conditions of war. Realizing the importance of this factor, the British Ministry of Food endeavored to put greater variety into the English dietary, even at the sacrifice of shipping space. Britain has not imported "luxury" foods, such as canned fruit, at the expense of the high priority foods, but when priority requirements have been met and shipping space has been available these luxury foods have, with considerable justice, been included. Foods suffer a "psychological" impairment when processed, and this loss is most keenly felt by a population which is striving for its very existence as a nation.

During the first half-year of the Lend-Lease Law, the United States are said to have shipped 107,000 pounds of fish oil, 2,200 pounds of carotene, 8,741 pounds of thiamine, and 5,000 pounds of ascorbic acid. Estimates also suggest that we are supplying one-fourth of the processed milk, canned meat, eggs, bacon, cheese, lard, and dried fruit imports of Britain. Evaporated and dried milk, cheese, dried eggs, concentrated citrus juices, vitamin A, and ascorbic acid are foods with high priorities. Canned fish, canned meat, bacon, and lard have lower ratings; and beans, peas, jam pulp, dried fruit, and starch are used to fill shipments.

In the feeding of our British ally and in the stocking of her emergency food larder, we have been of considerable assistance. Even while the Battle of the Atlantic is going in our favor, America has a prodigious task in supplying the foodstuffs required to protect Britain's population from the internal erosions of deficiency diseases. Should this battle on the seas become worse for any protracted period of time, we may expect the war effort of Britain to be hampered by nutritional deficiencies, primarily in vitamin A, ascorbic acid, and essential amino acids.

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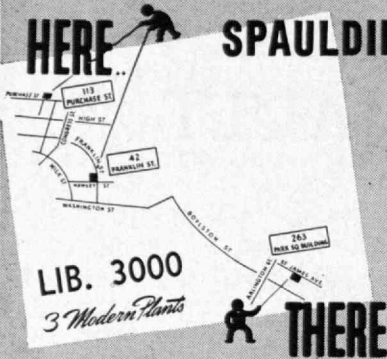
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MAIL RETURNS

(Concluded from page 206)

entrusted his writings for European publication, and in fact it was Couplet who supervised the publication of the *Astronomia*. He had with him, therefore, the manuscript of this work when he left China in 1681. *Ergo* the "auto" was devised in 1678 at the latest; I should say a year or so earlier, for Verbiest was a mighty busy man and it is not likely that he compiled his notes all of a sudden on the eve of Couplet's departure. . . .

Now that I write I am beginning to wonder whether or not this letter will ever reach you. The situation in the Pacific seems to be getting tighter, and boat service has been called off. Anyway, it is done and I'll watch for the first opportunity to get it off your way. *Shanghai, China*

THE TREND OF AFFAIRS

(Concluded from page 215)

into a saturated urea solution and drying them from an average moisture content of 53 per cent to one of 16 per cent act to safeguard the handles from checking and splitting, according to a recent publication. A pound of urea sufficed for treatment of twenty-one handles. The green wood is treated as soon as possible after being sawed. ¶ If paint will intumesce, it has some fire-retardant value. Intumescent, it puffs up under the action of heat, forming a spongy sheath from an eighth to a quarter of an inch thick, and part of it becomes an air-filled insulator holding actual flame away from the wood beneath and thus serving to delay the fire. A combination of white lead and borax with linseed oil, turpentine, and drier is one of the most successful fire-retardant paints developed thus far in research by the United States Forest Products Laboratory. In tests, unpainted wooden sticks lost about 80 per cent of their weight when subjected to flame within a perforated metal tube. Sticks protected by the paint based on borax and white lead lost about 20 per cent of their weight in the same length of time. ¶ Sales of electric lamps in 1941 reached an estimated total of 1,350,000,000—more than double the 570,000,000 recorded a decade earlier, almost five times the 280,000,000 of 1921. Twenty-two million fluorescent lamps were included in the 1941 total. ¶ Provision for a problem which may not be perplexing for a while is afforded by a portable overpass. Constructed of welded alloy steel, the assembly can be transported to its site by trailer truck and erected in about two and a half hours.

THE INSTITUTE GAZETTE

(Concluded from page 231)

modern languages should have due consideration. The Committee reiterated the recommendations of two years ago that the requirement of certain Courses that students have a reading knowledge of French or German to be admitted to the senior year might well be adopted as a minimum requirement for all professional Courses, and that the requirement might be broadened to include Spanish and Italian as alternatives.

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THE ALUMNI FUND—ITS PROBLEMS AND GROWTH

Preliminary Report

M.I.T. ALUMNI FUND 1941–1942

(AS OF JANUARY 15, 1942)

THE second year of our annual program of giving is drawing to its close. A new fund year starts on April 1. Of interest, therefore, is a comparison of the records and a glance at the trends. By January 15, faith in Technology's future and desire to play an active part in assuring that future were evidenced by 7,581 Alumni, who contributed \$74,436.10 to the M.I.T. Alumni Fund. Comparisons with figures recorded on January 15, 1941, show a slight increase in the number of contributors (3 per cent), and the total amount has risen over 18 per cent. Encouraging as these figures are, they still lag far behind the hoped-for goal of having 10,000 Alumni contribute \$150,000 annually. The soundness of this goal is amply attested by the results achieved by annual fund programs in other colleges and by our own past records of giving.

One important aspect is worthy of note. Last year a very large proportion of contributions (about 56 per cent) were exactly five dollars. Obviously, for want of other information, many Alumni were contributing the same amount which, as dues, they had been accustomed to pay annually to the Alumni Association of the M.I.T. With the publication of the first annual report, the true picture was apparent: Five dollars covered only subscription to *The Review* and association and fund expenses, while the Institute itself benefited only from those contributions in excess of five dollars. The record this year shows a definite awareness of this fact. Only 44 per cent of the contributions are now in the five-dollar bracket, and the number of really substantial donations has increased appreciably. The records by classes to date make interesting comparisons:

Class	Number in Class	Number of Contributors	Amount Contributed	Class	Number in Class	Number of Contributors	Amount Contributed
1868	2	2	\$ 10.00	1907	362	99	\$ 2,060.00
1869	—	—	—	1908	360	107	948.00
				1909	374	112	1,704.50
1870	2	1	10.00	1910	393	101	1,012.00
1871	2	—	—	1911	389	134	1,489.50
1872	2	1	13.00	1912	391	119	2,111.00
1873	3	1	25.00	1913	441	123	1,360.50
1874	1	—	—	1914	425	115	1,550.60
1875	10	2	15.00	1915	494	134	2,076.00
1876	9	4	119.00	1916	506	122	1,132.50
1877	14	6	66.00	1917	592	157	1,472.50
1878	4	2	40.00	1918	561	122	1,135.00
1879	15	4	26.00	1919	497	115	973.00
1880	5	—	—	1920	599	157	1,253.25
1881	10	6	49.00	1921	904	231	1,677.00
1882	14	5	79.00	1922	1,270	303	2,649.00
1883	16	7	71.00	1923	1,092	248	1,991.27
1884	34	14	124.00	1924	960	243	1,840.15
1885	46	16	1,119.00	1925	905	198	1,270.75
1886	55	17	305.00	1926	930	207	1,572.30
1887	61	24	364.00	1927	837	183	1,588.49
1888	96	34	491.00	1928	822	209	1,558.50
1889	85	26	503.00	1929	817	162	1,048.50
1890	97	39	1,065.00	1930	858	167	1,171.00
1891	120	49	516.00	1931	873	165	1,111.50
1892	147	46	618.00	1932	1,005	180	1,027.75
1893	162	60	1,830.50	1933	1,050	190	1,263.80
1894	155	55	1,013.00	1934	1,061	259	1,485.50
1895	158	49	1,215.50	1935	921	217	1,356.00
1896	258	90	1,013.00	1936	848	211	1,232.02
1897	201	49	1,478.05	1937	779	230	1,149.56
1898	259	58	1,243.00	1938	913	216	1,155.00
1899	221	60	1,271.00	1939	1,007	270	1,308.29
1900	251	65	1,377.00	1940	1,126	245	1,372.66
1901	251	71	1,165.00	1941	1,030	191	1,102.46
1902	263	80	968.00				
1903	282	80	1,083.00	1942		4	12.50
1904	340	87	1,093.70	Specials		19	138.00
1905	394	104	2,240.00				
1906	384	102	1,457.00	Total		7,581	\$74,436.10

Statistics are rarely stimulating. The true worth of the Alumni Fund is measured not in the percentage increases or decreases but rather in the spirit of those men who, in whatever capacity they may be serving, are striving toward a goal of major importance to the Institute's future. The Class Agents, the M.I.T. Alumni Fund Board, and every Alumnus who has actively supported the Fund give ample evidence of a spirit which can only result in the attainment of our self-appointed objectives.

ALUMNI AND OFFICERS IN THE NEWS

Speaker

❑ ARTHUR A. BLANCHARD '98, before sections of the American Chemical Society during a month's lecture tour of the South Atlantic states; and on "The Metal Carbonyls," before the northeastern section, Huntington Hall, February 10.

❑ FRANK B. JEWETT '03, at the 30th anniversary convention of the Institute of Radio Engineers. FREDERICK E. TERMAN '24 retired as president of the institute.

❑ H. B. RICHMOND '14, on "The Radio Manufacturing Industry," at a meeting of the Boston section of the Institute of Radio Engineers, December 19.

❑ HAROLD E. EDGERTON '27 presented a stroboscope exhibition before the National Association of Cost Accountants, Boston, January 20.

WYMAN P. FISKE, staff, spoke on "The Nature of Cost and Its Uses"; and RONALD H. ROBNETT, staff, was chairman of the entertainment.

❑ ROBERT S. HARRIS '28, on the nutritional status of England, at the October meeting, Massachusetts Public Health Association. Before the annual meeting of the same association, CHARLES J. LALUMIA '38 presented a motion picture, entitled, *Between the Cup and the Lip*, and FREDERICK J. ADAMS, staff, spoke on "Work of the American Public Health Association Committee on Housing and Health," January 29.

❑ ROSS M. CUNNINGHAM, staff, on "Locating and Appraising Product Ideas," before the American Marketing Association, New York, December 28.

❑ DUGALD C. JACKSON, emeritus, on "Early History of Science and Learn-

ing in America," at the midwinter meeting of the American Philosophical Society, February 13 and 14.

❑ GEORGE SCATCHARD, staff, on "Equilibrium Thermodynamics and Biological Chemistry," before the American Association for the Advancement of Science, Dallas, Texas, December 29.

DEATHS

* Mentioned in class notes.

❑ FRANK E. CAME '81, December 11.*

❑ GEORGE A. MOWER '81, November 26.*

❑ JOHN K. BURGESS '86, December 10.*

❑ FRED E. FOSS '86, January 18.*

❑ EDWIN A. SHUMAN '86, January 6.*

❑ THEODORE STEBBINS '86, October 14.*

❑ LILLIAN BRIDGES ROWELL (Mrs. W. E.) '90, August 13.*

❑ BARNARD CAPEN '91, January 16.*

❑ ALBERT S. GOTTLIEB '91, January 14.*

❑ MILTON H. KAUFFMAN '91, January 1.*

❑ ROBERT C. MITCHELL '91, January 8.*

❑ CHARLES N. COGSWELL '92, December 5.*

❑ BARTON P. JENKS '92, January 13, 1941.*

❑ THEODORE T. DORMAN '93, January 6.

❑ ANDREW N. WINSLOW '95, January 8.*

❑ JOHN L. COLEY '96, March 26, 1941.*

❑ PAUL CLIFFORD '98, December 16.*

❑ WILLIAM KELLEY '98, November 10.*

❑ WALTER C. WATROUS '98, December 1.*

❑ FREDERIC C. HIRONS '03, January 23, 1941.

❑ FRANK R. INGALSBIE '06, June 18.*

❑ ARAM TOROSSIAN '08, December 6.*

❑ MANUEL V. MURIEL '10, January, 1941.*

❑ MARTHA E. RICHMOND '14, January 19.

❑ CHARLES R. PARK '19, December 11.

❑ JOHN S. FERGUSON '21, January 1.*

❑ EMERY E. DEBACK '22, January 1.*

CLUB MEETINGS

As an aid to Alumni who travel extensively, The Review prints below a listing of regularly scheduled meetings of M.I.T. Clubs. Clubs which hold meetings only on special notice are not included

Atlanta, Ga.: Luncheon — First Tuesday of each month, 12:30 P.M., Grill Room, Atlanta Athletic Club.

Baltimore, Md.: Luncheon — First Monday of each month, 12:30 P.M., Engineers Club, 6 West Fayette Street.

Cincinnati, Ohio: Luncheon — Tuesdays from 12:30 P.M., main dining room, Metropole Hotel.

Columbus, Ohio: Luncheon — Second Monday of each month, 12:00 M., University Club, 40 South Third Street, except during July and August.

Dayton, Ohio: Luncheon — Second Saturday of each month, Engineers' Club, except during summer.

Detroit, Mich.: Dinner — First Tuesday of each month, 7:00 P.M., University Club, 1411 East Jefferson Avenue, or Intercollegiate Alumni Club, Penobscot Building, except June to September, inclusive.

Indianapolis, Ind.: Dinner — Usually third Friday evening of each month, September to May, inclusive.

Louisville, Ky.: Luncheon — Mondays, 12:15 P.M., French Village.

New York, N. Y.: Full club service, including restaurant, cocktail lounge, rooms, barber shop, and so on. Special round-table luncheon every day. Technology Club of New York, 24 East 39th Street.

Pittsburgh, Pa.: Luncheon — Fridays, 12:15 P.M., Norse Room, Fort Pitt Hotel.

Richmond, Va.: Luncheon — Last Monday of each month, 12:00 M. to 1:30 P.M., Commonwealth Club.

San Francisco, Calif.: Luncheon — Tuesdays, 12:00 M., Engineers Club, 206 Sansome Street.

Syracuse, N. Y.: Luncheon — Mondays, 12:15 P.M., Hotel Onondaga.

Washington, D.C.: Dinner — Fourth Friday of each month, 5:00 P.M., Young Women's Christian Association, 17th and K Streets, Northwest, except during summer.

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

M.I.T. Club of Akron

Charles Rudisel Park '92 was fatally injured on December 11 in a sewer-gas explosion which destroyed the Parkway Restaurant adjacent to the Firestone Tire and Rubber Company in Akron. His death occurred several hours after the explosion.

Dr. Park was born in Tiffin, Ohio, on August 21, 1894. After receiving degrees from Cornell and Minnesota universities, he served the Institute as an instructor from 1917 to 1922 before accepting a position at the Goodyear Tire and Rubber Company. After periods of absence from Goodyear for work in carbon-black development, Dr. Park transferred to Firestone as a research chemist. He was called on to serve as assistant director of research and manager of new-products development before assuming, on June 1, complete responsibility for the production of bulletproof gas tanks. He published papers on several phases of rubber research.

Dr. Park was active in many local organizations as well as in the American Institute of Chemical Engineers, the American Chemical Society, the American Institute of Chemists, and Alpha Chi Sigma professional fraternity. His most enthusiastically pursued hobbies were music and gardening. His wife, Kathryn; his son, John; and his mother and sister survive him. The members of the Club join the family in mourning the tragic death of their beloved Charlie Park. — WENDELL K. FITCH '36, *Secretary*, 695 Schiller Avenue, Akron, Ohio.

M.I.T. Association of Cleveland

In keeping with our annual custom, the Association had the pleasure of entertaining about fifteen students home from the Institute for the Christmas holidays. This meeting was in the form of a luncheon held on December 27 at the Mid-Day Club in Cleveland. After brief remarks of welcome by our President, Erle Whitney '07, we heard from a few of the undergraduates reports on current activities at the Institute. The part that the school is playing in the war picture received its share of comments as did athletic and academic activities. We owe special thanks to Charley Smith, Jr., '42 for an excellent job in extending our invitation to the present students and in arranging other details for the program.

Interesting observations and side lines on the situation in the Far East, based on long personal observations in that part of the world, were presented to our organization by Brooks Emeny, chairman of the Foreign Affairs Council of

Cleveland, at a meeting held on January 19. Dr. Emeny's remarks held his audience in rapt attention, and all present agreed that this meeting was one of the most interesting that we have held for some time. Of special interest to us as Alumni was Dr. Emeny's statement that the last time that he addressed a group of former M.I.T. students was a few years ago in Shanghai. Many of those who attended the Shanghai meeting are actively engaged in China's fight for survival or have already made the supreme sacrifice. — In the unavoidable absence of President Whitney and our Vice-President, Howard P. Ferguson '27, the Secretary acted as toastmaster, and William L. Enfield '10, former President of the Cleveland Association, introduced the speaker.

We are pleased to note the active service of many of our former Cleveland members, but we miss their presence at our meetings. The defense production activity, however, has brought about an influx of some Alumni, so that our total on the roster remains virtually the same. — H. ARTHUR ZIMMERMAN '37, *Secretary*, Weatherhead Company, 300 East 131st Street, Cleveland, Ohio.

M.I.T. Club of Northern New Jersey

The banquet committee met on January 21 to formulate plans for the annual banquet tentatively scheduled to be held on May 7. Warren H. Dolben '30, chairman of the banquet committee, led the discussion on arrangements, speakers, entertainment, and so on. He was ably assisted by Maxwell Burckett '21, President of the Club. Other committeemen present were Clarence Van C. Chamberlin '23, Lyman L. Tremaine '23, James R. Buckley '27, and John H. Francis '35. In addition, the following were present: Gordon G. Holbrook '10, Kebe Toabe '15, Earl C. McMahon '26, and Newton S. Foster '28.

The ladies' auxiliary of the Union County regional group of the Club made all arrangements, issued all invitations, and, in short, completed a fine mixed get-together in the form of a dance and bridge on January 31. The affair was held at the Suburban Golf Club in Union township. Proceeds of the evening were donated to the War Relief Fund. Charlie E. Roche '23 and his eight-piece orchestra provided delightful music for the evening.

The committee for this get-together was made up of the wives of the following Alumni: Kebe Toabe '15, Louis H. Zepfler '15, Alan P. Sullivan '17, Charles T. McGrady '22, Manswell S. Richards '22, Lyman L. Tremaine '23, Eugene C. Hermann '25, Lester B. Woolfenden '27, Allan L. Tarr '28, and Bryant F. Kenney '30. —

NEWTON S. FOSTER '28, *Secretary*, 73 Daniel Avenue, Rutherford, N.J. *Assistant Secretaries*: ROBERT F. WAY '33 and WALTER L. WISE, JR., '34, Colgate-Palmolive-Peet Company, 105 Hudson Street, Jersey City, N.J.

Technology Club of New York

At the December 4 fall smoker, Horace S. Ford, Treasurer of the Institute, was the guest speaker. About 120 Alumni from the classes of '38 to '41 enjoyed *Nickelodeon Nights*, a movie presentation of old favorite films. Among the thrillers were *The Great Train Robbery* and the *Perils of Pauline*. Such famous stars as Charlie Chaplin, Pearl White, and William S. Hart were represented. The entire audience joined in singing old-time songs, following the bouncing ball on the screen as the melodies were pounded out by the piano player who actually played in a nickelodeon thirty years ago.

Refreshments included giant turkey sandwiches, beer, and cider. The affair was a complete success, and the young guests were very much impressed by the activities and facilities of the Club. The plan is to make the fall smoker an annual event, an introduction to the Club for each year's graduating class.

The Alarm Clock Club, a recently formed organization, held its first meeting in the club's main dining room on January 13. The name was derived from the fact that the end of the meeting is announced by an alarm clock, so that guest speakers must confine their messages to a time limit. The meetings last from 12:45 to 1:45 P.M.

The American Society of Civil Engineers held its annual luncheon at the Club on January 22. Forty-five guests were present, and the principal speaker was Charles B. Breed '97, Professor of Civil Engineering and Head of the Department of Civil and Sanitary Engineering at the Institute.

Plans for the annual dinner of the Club are now being considered and will be announced in a forthcoming issue of *The Review*. Recent new members of the Club include Francis L. Cronin '23, William H. Callahan '26, James J. Spartaes '38, and Harry W. Tileston, Jr., '39. — WILLIAM D. NEUBERG '17, *Secretary*, 24 East 39th Street, New York, N.Y. CONSTANTINE S. DADAKIS '34, *Publicity Committee*, 644 Riverside Drive, New York, N.Y.

Technology Club of Philadelphia

Members of the Club and undergraduates from this vicinity had an opportunity to meet each other and to hear Francis J. Chesterman '05, Vice-President of the Bell Telephone Company of Pennsylvania and a life member of the Insti-

tute Corporation, speak at the annual holiday luncheon on Wednesday, December 31, at the Manufacturers and Bankers Club, Philadelphia.

Of the forty-six members and guests present, seventeen were undergraduates home for the Christmas recess. As each undergraduate was introduced to the group, he told his Class, Course, and extracurricular activities at the Institute. The Class of '15, with eight members present, led in class attendance. — GEORGE T. LOGAN '29, *Secretary*, 1000 Chestnut Street, Philadelphia, Pa. HENRY F. DALEY '15, *Review Secretary*, B. F. Sturtevant Company, Cresmont and Haddon Avenues, Camden, N.J.

Technology Club of Rhode Island

The Club's annual ladies' night was celebrated on Wednesday, January 7, with forty-five members, fair ladies, and guests attending. A social assembly was held at 6:00 P.M. at the Providence University Club, providing opportunity for the older members and their wives to renew acquaintances and for the new ones to become better acquainted. Dinner was served at 7:00. The University Club chef did himself proud with one of his famous mixed grills. Several former Glee Club members warmed up with "Take Me Back to Tech" and went on into a review of the popular and old songs, not excluding "Sweet Adeline."

Donald G. Robbins '07, our President, brought up to the assembly the question of whether Technology should go in for competitive football. A voice vote and the comments made by several of the members made evident the fact that everyone present thought this an inopportune time for such a venture. We agreed that Technology football should remain intramural for the duration. At eight o'clock the group adjourned to the Rhode Island Auditorium and enjoyed 27 great acts of "Rhythm, Youth, and Beauty" (as advertised) presented by the *Ice Capades* of 1942. A block of choice seats had been reserved, and everyone pronounced the evening a huge success at the end of the three-hour show.

The following members and guests attended: Mr. and Mrs. Zenas W. Bliss '89 and guests, Mr. and Mrs. Albert C. Dickerman '05, Donald G. Robbins '07, Mr. and Mrs. Kenneth S. Johnson '15, Mr. and Mrs. Theron S. Curtis '16, John M. Hanley '18, Mr. and Mrs. Oliver F. Freeman '19 and daughter, Mr. and Mrs. Norris G. Abbott, Jr., '20 and guests, Mr. and Mrs. James L. Entwistle '21, Mr. and Mrs. Walter M. Saunders, Jr., '22, Mr. and Mrs. Royal Sterling '23, Mr. and Mrs. Harold J. Creedon '27, Mr. and Mrs. John DeB. Eldert '27, Mr. and Mrs. William E. Gould, Jr., '28, Mr. and Mrs. Harold W. Greenup '29, Mr. and Mrs. George E. Colby '32, Mr. and Mrs. Leonard Shapiro '34 and guests, Mr. and Mrs. Prescott A. Smith '35, and Edgar J. Staff '35.

Notes of regret were sent by several regular attendants who were forced to be

out of town. These members included Norman D. MacLeod '14 and J. Douglas Robertson '16. William C. Dart '91 wrote that he has given up the night life of late but sent best wishes. Mrs. Edwards, wife of Ariel B. Edwards '93, wrote that he was too sick to attend. We were all sorry to learn of Mr. Edwards' illness.

Our next meeting will probably be at the Anawan Club, Rehoboth, Mass., in early March. Previous attendants will recall with pleasure the famous dinners at this club where the steaks are broiled over the open fire. — JOHN M. HANLEY '18, *Secretary*, Post Office Box 1366, Providence, R.I.

Technology Club of Rochester

On November 27, thirty members attended a dinner at the University Club of Rochester. Dudley S. DeGroot, football coach of the University of Rochester, answered questions about football and showed excellent films of Rochester games and of the 1941 East-West game. Dud's explanation of the qualities desirable in a player at each position and of how to watch a game was one of the most interesting, humorous, and informal talks ever made at our meetings.

On December 30, Avery A. Ashdown '24 of the Institute Faculty, ten undergraduates from Rochester, and twenty-five Alumni had lunch at the University Club. George S. Dundon '45 told his impressions as a freshman; John Goldsmith '43 talked about the effect of war on undergraduate activities and the curriculum; and Dr. Ashdown described the effect of war on Technology in general. He feigned indignation at Dundon's impression that a student has to teach himself at Tech. — WINFIELD PARTRIDGE, Jr., '33, *Secretary*, 76 Magee Avenue, Rochester, N.Y.

Washington Society of the M.I.T.

The Society held its December meeting at the Y.W.C.A., 17th and K Streets, as usual on the fourth Friday at 5:15 P.M. Undergraduates who attended as guests were: Donald W. Augusterfer '42, Curtis D. Buford '42, Charles F. Leiserson '42, Russell A. Thompson, Jr., '42, Herbert G. Twaddle '42, Warren W. Twaddle '42, Henry R. Brown, Jr., '43, W. Gordon Pool '43, Robert D. Arnold '44, Ralph S. LaVallee '44, and Paul D. Seghers '45. W. Bruce Gist, Jr., '45, our regional scholarship winner, was also present.

T. C. Mooney, deputy commissioner of the Bureau of Internal Revenue, talked on "The War and Your Taxes." After Mr. Mooney, Herwil M. Bryant, who was with Admiral Byrd's South Pole expedition, showed Kodachrome pictures, under the heading "Far Away from Taxes," taken on the expedition. Merton Emerson '04 presided in his usual capable and delightful manner. We enjoyed a quartet who, under the leadership of Albert F. Bird '30, sang some of the old songs to the piano accompaniment of Bob Thulman '22.

The following additional M.I.T. men and guest enjoyed the talks and the dinner: C. Leonard Brown '88, John G. Crane '90, Proctor L. Dougherty '97, Benjamin A. Howes '97, Frederick A. Hunnewell '97, Martin Boyle '98, Charles Bittinger '01, Hewitt Crosby '03, Amasa M. Holcombe '04, Kenneth P. Armstrong '10, Carl G. Richmond '11, Louis J. Grayson '19, Wendell P. Sammet '20, Le Roy M. Hersum '21, William K. MacMahon '22, George D. Fife '24, John D. Fitch '24, George E. Lamb '24, Harry B. Swett '25, Morris L. Minsk '26, John A. Plugge '29 and guest Hugh E. Augusterfer, Nicholas P. Stathis '29, Jack R. Bloom '30, Frederick M. Moss '32, and Benjamin T. Howes '39. — AMASA M. HOLCOMBE '04, *Secretary*, 428 Munsey Building, Washington, D.C. WILLIAM K. MACMAHON '22, *Review Secretary*, Rosslyn Gas Company, 3240 Wilson Boulevard, Arlington, Va.

CLASS NOTES

1881

The Class Secretary, Frank E. Came, died on December 11. The Review Office has no further information, at the present time, on his death.

Word has recently been received of the death on November 26 of London's oldest American resident, George A. Mower. The eighty-one-year-old engineer and business head, who was a firm advocate of 100 per cent production effort for wartime Britain, lost his business premises at Queen Victoria Street by enemy action but stayed in London during the whole period of the blitz. It was his custom to drive home night after night amidst falling shrapnel, and alone he extinguished an incendiary bomb which hit his house. He was very proud of the immense amount of sympathy and help America has given to Britain, and his own factories were working 23 and 24 hours a day, even in 1939.

Mower first went to London as a consulting engineer representing the Sturtevant Blower Works in Hyde Park, where he was employed after being graduated from M.I.T. A prominent member of many business circles for fifty years, he was, at the time of his death, chairman of the Igranic Electric Company, Ltd., of Bedford; Sturtevant Engineering Company, Ltd., of Bush House; Crosby Valve and Engineering Company, Ltd., of Wembley; Bifurcated and Tubular Rivet Company, Ltd., of Aylesbury; and several associated companies. In 1909 he was elected chairman of the American Society in London and later became the treasurer, serving for an unprecedented period.

A well-known first-nighter, Mower was a keen and charitable friend of the theater world, a popular acquaintance of the stagehands. He was a favorite with all actors and actresses, from the most famous to those mounting the first rung of the ladder. — He leaves his widow, the former Katharine Packard of Syracuse, N.Y.; and two daughters, Mrs.

1881 Continued

Leslie M. Paterson, who has just entered her third term as mayor of Aylesbury, and Miss Marion Mower, a volunteer worker in the American Ambulance Corps in Britain.

1886

Within the last few months, death has taken from our midst four members of the Class — Theodore Stebbins, John K. Burgess, Edwin A. Shuman, and Fred E. Foss. — After graduation, Stebbins went to Schenectady to work for the General Electric Company, where he remained for about twenty years. He then moved to New York, where he opened an office as a consulting engineer and built up an extensive practice which took him to many parts of this country and to several countries in South America. He retired from active practice about ten years ago and died on October 14. Surviving him are his two sons, Theodore E. of Syosset, Long Island, and Rowland of Medfield, Mass.

John Burgess died on December 10. He spent his life in his home town of Dedham, where he became an influential and useful citizen, serving the town as selectman, bank director, and, for several terms, member of the state legislature. He is survived by a daughter, Mrs. Barbara Joyce of New York City.

Edwin Shuman left the Institute to enter the firm of A. Shuman and Company, where he remained till that firm sold its business to Jordan Marsh Company. After his retirement, Shuman served his city and state in many social and philanthropic organizations. Although he had recently moved to Marblehead, for the greater part of his life he was a resident of Boston. He died on January 6. His widow, two sons, and a daughter survive him.

Just as these notes are being sent to the publisher, word comes to me of the death, at Bethesda, Md., on January 18, of Fred E. Foss, professor emeritus of civil engineering at the Cooper Union. An account of the life and activities of Professor Foss will be published in a future issue of *The Review*. — ARTHUR G. ROBBINS, *Secretary*, 12 Grove Street, Winchester, Mass.

1888

Edwin S. Webster wrote your Secretary a long letter in January, giving very interesting information about the work Stone and Webster, Inc., is doing in building plants for national defense. Unfortunately, under the present war conditions, I can give you only a very general idea of the tremendous work the company is doing. Kankakee, Ill., has the first great TNT plant designed and constructed by Stone and Webster. The Du Pont company, which designed the process equipment, is now operating this plant for the Ordnance Department of the United States Army. The Kankakee organization, standing on a 22,000-acre plot formerly covered by cornfields, is now one of the biggest, most efficient, and safest TNT plants in the world. All the construction was done ahead of

schedule — the laying of 51 miles of railroad, 124 miles of highway, and 85 miles of pipe line, and the erection of 460 buildings. We should be proud of our Class President and of his big army of helpers, from the large staff of technical engineers down to the indispensable laborers. The temporary wooden executive building was half a mile long.

Ned says that he has two nephews in the Navy, one an ensign and another a lieutenant, and a grandson who is going into the aviation branch of the service as soon as he gets his degree from Harvard. Ned's son, E. S. Webster, Jr., was married on January 10 to Jean Bennett, daughter of Mr. and Mrs. Archibald S. Bennett of New York, in the Riverside Church by Rev. Dr. Harry Emerson Fosdick. The bride, a member of the Daughters of the American Revolution, was graduated from Hunter College. She is a descendant of William H. Prescott, the historian. Ned, Jr., was graduated from Harvard in 1923 and Harvard Business School in 1925. He is a senior partner of Kidder, Peabody and Company and a director of Stone and Webster, Inc.

I claim another record for '88, for promptness in answering letters requesting news. I wrote three classmates, one letter traveling 1,200 miles from Princeton, and within forty-eight hours after the letters left here, replies were on the way back. These paragons of promptness were Bates, Eastman, and Foque. Bates says: "I am getting along slowly but still am very much attached to my brace — mechanically, not affectionately. I can't yet bear full weight on my leg or flex my knee — a fine outlook for next spring, with seed catalogues beginning to come in! I thought you might be in the Navy by now. A few years ago I was joshed by my friends for criticizing the fair sex for their clinging to silken apparel, canned crabmeat, and trinkets marked 'Made in Japan.' The joshers don't say so much now."

Eastman, the grand old patriarch of the Class, now eighty-one years old, says: "I am very well but am becoming more and more handicapped in getting about. I don't drive my Model T as much as I used to. Being eighty-one, I can't expect to be as husky as you and Fred Ellis."

Foque says: "I'm still in Minnesota; don't think I'll try Florida or California again, but may go to Arizona once more. Did you know that Ellis ran for mayor of Melrose? He decided to keep his present job, superintendent of public works, however, as it pays double the salary of mayor. One of my grandsons has been accepted by the Naval Reserve and expects to be sent to a training ship to prepare for a commission. — I suggest that President Roosevelt borrow the Swiss navy to help the Dutch clean up the Pacific."

I had a fine visit and wonderful dinner a little while ago with Brother Besler and his charming wife in my neighboring town of Plainfield. — Ulie Holman wrote me recently that he was leaving the hospital "within the hour." He went there

for a week and stayed nearly a month. — Johnnie Runkle has consented to remain our representative to the Alumni Council for another term of five years. Our active membership seems to be deserting the Boston area, possibly on account of submarine activity. John is different, for he was graduated from M.I.T. to the full-rigged ship, *Thomas Dana*, of Boston, for a voyage around the Cape of Good Hope. Now he has settled down to Cambridge and Duxbury.

After April 5 your Secretary hopes to be of some service in guarding the northeasterly entrance to Casco Bay and Chebeague Island. — BERTRAND R. T. COLLINS, *Secretary*, 39 Wiggins Street, Princeton, N.J. SANFORD E. THOMPSON, *Assistant Secretary*, Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston, Mass.

1890

The first annual report of the M.I.T. Alumni Fund says: "Charles W. Sherman, '90, led his class to the top on both counts [percentage of contributors and average contribution] in the 1890-1899 group, with well over a third of its members contributing an average of \$22.48." Charles says that, with his duties as president of the Belmont Savings Bank, his professional work on water supply, and the attendant difficulties with priorities, he is sometimes too busy. We are happy to say he does not look worn.

A note from one of our classmates residing outside the United States tells of difficulties in securing permission to obtain United States exchange for a payment to the Alumni Fund. He says he was limited to a "token contribution."

William L. Creden has been elected chairman of the Montana Society of the M.I.T., and apparently he is in good condition, because he says nothing about himself in his reply to the Secretary's letter of congratulation.

Carney, looking hale and hearty, dropped in to see the Secretary toward the end of November. It would be great if more of you fellows would do likewise or at least send in a note telling what you are doing. Jim has been satisfying his greed for travel again this year. In January he took the boat to Guatemala, then flew to Cristobal and spent some time in Panama. There, with a flare at night, he hunted black jaguars, and even crossed a river in a 30-foot dugout. He took in the carnival, which he says is more beautiful and colorful than the one he had previously enjoyed at Rio. From Panama he went to Cuba, traveling the whole length of the island. Then, as an interlude because he is having some trouble with a knee as a result of an accident many years ago, he spent some time at Hot Springs, Ark. Even there he took some trips — into the Ozark Mountains and to Ozark Lake.

Later, in the cherry season, Jim went to Ephraim, Wis., where, he says, they never let a cherry tree grow so high the fruit cannot be picked from a stepladder; and after a few years of bearing, the tree

1890 Continued

is dug up and a new one planted. In August he went to Glacier Park, Waterton, Banff, the Columbia Glacier, Jasper Park, Vancouver, and Portland, Ore. He told me something about thirty tons of blackberries, but the Secretary neglected to note whether Jim ate them or picked them. Then he went to Astoria, over the new Pacific Coast highway, and up to Crater Lake, finishing by way of the Bonneville Dam, where he saw salmon going up a fish ladder at the rate of 20,000 a day.

Lillian Bridges Rowell died on August 13. She took Course VII at M.I.T. after being graduated from Boston University; and certainly the world is better for her technical training. After graduation she traveled in Europe and taught in high schools before marrying Wilbur E. Rowell in 1908 and settling in Lawrence, Mass. There, after Y.W.C.A. work for foreign-speaking women, she became interested in the Lawrence General Hospital and in 1914 was elected president. She held that office continuously until the time of her death. When she became president, the property of the hospital was, in round numbers, worth \$369,000. In 1940 it was worth \$1,300,000. In the first year of her service the cost of operating the hospital was \$53,000, and in her last year it was \$170,000.

Under Mrs. Rowell's administration professional accounting and auditing were introduced; a sprinkler system was installed throughout the hospital buildings, and a laboratory and clinics were established. An x-ray department was set up and later was greatly enlarged. In the last two years of her administration a new building was erected, which, with its equipment, cost approximately \$600,000; and a successful campaign for contributions was carried on. The new building was finished in her lifetime, and she presided at the dedication in May, 1941. She had planned to retire from the presidency at the annual meeting of October, 1941, but she did, in fact, die in office. The promotion of the interest of this hospital was practically her life work. Few days passed without some activity on her part for the hospital. Besides the home at Lawrence the Rowells had a house at Hopkinton which belonged to her ancestors and which she enjoyed furnishing with antiques. Once more we are reminded of how little we know about what our classmates are accomplishing and of how proud we could be of them if they were not so modest.

The following classmates have moved: Francis W. Crosby, to the Mt. Royal Hotel, 4311 Prospect Avenue, Cleveland, Ohio; Henry B. Pennell of Pennell, Gibbs and Quiring Company, to 169 Newbury Street, Boston; Miss Mary P. Winsor to 140 Dudley Road, Newton Centre, Mass.

In the January notes, the award of honorary membership in the American Society of Civil Engineers to Henry M. Waite was briefly mentioned. The following tribute is from the first and last paragraphs of an encomium appearing in *Civil Engineering* for January: "More versatile than most engineers, Henry Matson

Waite has succeeded in a wide range of engineering service — transportation, mining, municipal, army, and government. His achievements in these varied fields bear significantly on his qualities of technical skill and practical judgment. In the days of his vigor, and more recently through a period of illness, Colonel Waite has been greatly admired for his engineering accomplishments and for his qualities as a man. A great engineer, a careful planner, and a fine public servant is now recognized in the award of Honorary Membership in the Society." — GEORGE A. PACKARD, *Secretary*, 50 Congress Street, Boston, Mass. HARRY M. GOODWIN, *Assistant Secretary*, Room 4-242, M.I.T., Cambridge, Mass.

1891

This is not our usual month for class notes, but we wish to pay tribute at this time to four of our classmates who have passed on since the first of the year. Our esteemed Assistant Secretary, Barnard Capen, died on Friday, January 16, at Framingham, Mass., after an extended illness. Your Secretary is unable to express properly the feelings of friendship, kindness, and admiration which we, his classmates, held for Barney Capen. The position, or "place" if you will, that Barney held in the Class of '91 was unique. It is not likely that any one man ever has held or ever will hold a similar position in any Class at M.I.T. His place in our affections was built up over many years by his unusual desire for the friendship of his classmates, expressed by his interest in them and fondness for them. Later, through his years of physical hardship, his inability to do most of those things which most people feel necessary to happiness brought him even closer to us. In his mind these friendships largely offset his infirmities and lack of material luxuries, and he never complained.

Long ago, probably while at the Institute, Barney kept a birthday book and sent us birthday cards each year. This thoughtfulness was later, in some cases at least, extended to our wives and children. This may seem a small thing, too unimportant to emphasize, but as time went on and we became scattered and he was obliged to retire from business, some of his classmates replied by letters telling of their doings, knowing that they would interest him. He received long letters with maps and illustrated pamphlets about their trips — letters such as are seldom written from one classmate to another. The communications were used for class notes in *The Review*, and consequently the duties of the Secretary were chiefly editorial.

The Class had been very generous in helping Barney in later years, but his example of fortitude, which rose above his physical infirmities, was a lesson to us all and led to our expressed feeling that we owed him more than he owed us. Long before our fiftieth reunion his mind was set on going, even to spending a night or two at the hotel, but when the long-anticipated time came he was

not in condition to do more than be driven to Swampscott for Saturday luncheon and be taken home in the afternoon.

Several of his classmates attended the funeral services in Dedham. To say that we shall miss him only partly expresses our regard for Barney Capen. Perhaps it may better be said that many of us never will forget him. The following notice is from a Boston newspaper of January 18: "He was born in South Boston and attended Boston English High School and . . . Technology. . . . Following his graduation, he entered the employ of the telephone company. He was a life member of the American Unitarian Association, charter member of the M.I.T. Club, and at one time sang with the M.I.T. glee club and the Boston Choral Union. He leaves his widow, the former Eva M. Daniels."

A letter from Eli Bird telling of the death of Albert S. Gottlieb on January 14 at Harrington, Del., was a shock to all of us who have known Albert over the years. He has been most loyal to the Class, attended most, if not all, of our five-year reunions, and was actively interested in all of our affairs. We all liked him and shall miss him. He attended our fiftieth last June and took in all the festivities, but he was not well and had not been for some time. Gottlieb said that it was a struggle for him to come, but he had looked forward to it and would not be denied. He came over on the New York boat with Bird, Swan, and Spooner, and they were delayed by storm and missed the luncheon at the Algonquin Club.

Bird's letter is a tribute to which all of us who knew Gottlieb will subscribe: "In Gottlieb we had a faithful classmate. At almost every reunion, he was my companion on the trip to Boston. He told me he lost many dollars when the depression closed in on him, as he kept his men on for months with little or nothing to do rather than fire them after their years of faithful effort for his business. Withal, he was optimistic and looked on life with the hope of better days to come. We shall miss him, but his memory will always be an inspiration to us to look on life from the right angle and not to weigh down those with whom we come in contact."

The following notice is from the New York *Times*: "Albert S. Gottlieb, a retired architect who was in practice in New York for more than forty years, died . . . at his home at the age of 71. Born in Port Chester, N.Y., he was educated at the Brooklyn Polytechnic Institute, . . . Technology, and the Ecole des Beaux-Arts, Paris. Starting as a draughtsman with McKim, Mead & White, he had his own office from 1901 to 1934. Mr. Gottlieb designed the Temple B'nai Jeshurun, Newark, N.J.; Greenville Public Library, Jersey City, N.J., and the Fifth Avenue, New York, office building of L. Alavoine & Co. In 1920 he married Katherine M. Welch of Harrington, who survives."

Robert C. Mitchell, a patent lawyer, died on January 8. His home was at

1891 Continued

Guilford, Conn., and his offices in the Graybar Building, 420 Lexington Avenue, New York City. He led an active life and was interested in golf, boating, fishing, and traveling. He attended our twenty-fifth reunion and expressed interest in our fiftieth but did not attend. A letter which he wrote at the time of our forty-fifth shows his interest in the Class, even though he was only with us a short time: "I feel like an outsider, having spent only one year with the Class. That year was a happy one, and I made many friends without whom I would have been much poorer indeed. I'm just enough of a sentimental old devil so that if I don't get to the reunion I want you to give my love to all the old boys. Perhaps they will remember me as center rush on our only championship team, of which Ned Herrick '88 was captain."

Milton H. Kauffman of Denver, Colo., died on January 1. We heard from him in connection with our fiftieth, but he could not come, and we have not seen him for many years. The following notice is from a local paper: "Milton H. Kauffman, former chemical engineer, and a resident of Colorado for 35 years, died . . . on the street near the home of friends, . . . where he had been living for the past few years. He was 72."

"Born in 1869 in Cincinnati, Mr. Kauffman was graduated from . . . Technology. In 1906 he moved to Durango, where he was associated with the American Smelting & Refining Co. for many years. He came to Denver in 1916. His wife died four years ago. Surviving are a daughter, Mrs. Clarence Parks Taylor of Dallas, Texas; a son, Henry Kauffman of Pueblo, and a sister, Mrs. H. W. Bettman of Cincinnati."

A class dinner was held on January 23, and we shall tell you about it in a future issue. The class book has been distributed and seems to have met with general approval. A few were left over, so anyone who wants another copy may have one. As one enthusiast said, "The cover designed by Eli Bird makes it look like a million." We were also fortunate in getting some good pictures.

The following changes in address have been received: Miss Margaret E. Maltby is living at 501 West 113th Street, New York City, and not at 501 West 11th Street as noted in the class book. Also, George H. Spooner's address is 14 Kensington Terrace, Maplewood, N.J., instead of 31 Kensington Terrace. W. H. Punchard is now living at 56 Waverley Avenue, Newton, Mass. Alfred W. Bell's present address is 1347 Walnut Street, Newton Highlands, Mass. — HENRY A. FISKE, Secretary, Grinnell Company, Inc., 260 West Exchange Street, Providence, R.I.

1892

The turn that world affairs have taken during the past few months has completely upset the plans for our reunion in June. Probably before this issue is out every member of the Class will have received a letter giving particulars about the postponement of festivities. The deferment of our fiftieth is a great disap-

pointment. I had already received letters from some of our members expressing their intention of attending.

Scott Parrish wrote: "I am enjoying excellent health and keep very busy every day. I look forward to attending the reunion with a great deal of pleasure. This is an event which every member of the Class should try to attend, even if he has to come on crutches." — Augustus F. Knudsen wrote from Los Angeles: "Since I have been ill as well as busy, I seem to have dropped out of contact with M.I.T. for quite a while. As I am free to be in Boston, I want to be there for our Class Reunion. I have not seen the East for many years, so I shall take a couple of months and look up friends from here to Cape Ann."

Severance Burrage wrote: "I am teaching two classes at a Catholic school for girls two afternoons a week, and I am doing some bacteriological work at one of the finest dairies in the Rocky Mountain region, also twice a week. Aside from that, I am president of the Colorado Society for Clinical Pathologists, a member of the Denver Public Health Council, a member of the board of directors of the Colorado Crippled Children, an active member of the Denver Rotary Club, a member of the board of trustees of the First Unitarian Society of Denver and of other small organizations. So you see, I am kept fairly busy for an old man. I shall make every effort to attend the fiftieth reunion next June."

Press notices have been received of the death of Charles N. Cogswell, IV, on December 5. Cogswell was a noted architect. I have also received the notice of the death of Barton P. Jenks, IV, on January 13, 1941. — CHARLES F. PARK, Secretary, Room 5-111, M.I.T., Cambridge, Mass.

1895

Amidst the great turmoil in the world at the present time and the expectancy in our supreme efforts to meet an all-out war program, news from Judson Dickerman, who was in Mexico City in a government capacity, is indeed refreshing.

Dickerman wrote on January 6: "At last I can contribute a bit to the class news of '95, since I am in Mexico City as a member of a staff looking into the expropriation of petroleum property by the government of Mexico in 1938. I expect to be around these parts for most of January. I have seen a wonderful old church, magnificent in the volume, artistic quality, craftsmanship, and value of its hundreds of pounds of real gold leaf used in finishing the figures and ornamental façades, and so on. All the craftsmanship was that of the native Indians of two hundred years ago. Spanish friars supervised the general plans. Native Mexicans of the more intelligent groups seem to favor considerable general support for the United States in the war."

Andrew Nickerson Winslow of 10 Mt. Vernon Square, Boston, passed away on January 8. Winslow was affiliated with our Class during the years 1891 and 1892. For a number of years his home was in Newton Centre, Mass. He was never

active in class affairs, yet he wanted to be counted on as a '95 man. Details of his passing are not available at this writing. — LUTHER K. YODER, Secretary, 69 Pleasant Street, Ayer, Mass.

1896

At the moment these notes are being dictated, the most important item is the meeting of the New York '96 group, scheduled for Tuesday evening, February 10, at the President Tavern, Lexington Avenue and 41st Street. Both of the Class Secretaries promised to attend. This year, because of the absence of Bakenhus, now in Savannah, the preparations were in the hands of John Tilley, and John guaranteed a real party.

The Class is deeply obligated to Henry Fiske '91, who made a personal call on the Secretary and delivered to the Class a copy of '91's golden reunion book, a very fine production. The Secretary also wishes to acknowledge receipt of Christmas cards from several classmates, including: Mark Allen, Bakenhus, Jacobs, Leland, Lythgoe, Melliush, Rockwell, Rutherford, Tilley, Tucker, Tyler, Wayne, and W. A. Wood. Mention should also be made of a card from the Class of '87 through its Secretary, Nat Very, and a card from Fanny Maclachlan, the widow of Andy Mac. Fanny has continued to live in Melrose all through the years and, she always remembers the Secretary with annual greetings. The Secretary can promise that any classmate who finds it possible to pay a call on Mrs. Maclachlan will receive a cordial welcome.

The annual contribution of \$50 from the Class for the benefit of M.I.T. athletics has been paid to Ralph T. Jope '28, Secretary of the Advisory Council on Athletics, and a cordial note of appreciation has been received from him.

Another honor has come to Coolidge through the award of the Duddell Medal of the Physical Society in London. This award has been bestowed but seventeen times previously, and only two other Americans have been thus honored. This award forms the newest link in a long chain of similar honors which have come to Dr. Coolidge, both in this country and abroad, for his research and discoveries in the field of science.

Gene Hultman has been called upon by Leverett Saltonstall, Governor of Massachusetts and member of the Institute Corporation, to serve on a special emergency committee of six members to act as his special advisers in dealing with engineering and other problems that may arise in the present unusual situation. Gene finds his time pretty well occupied these days with his normal and special duties, but he feels that if a day should come when time hangs heavily on his hands, especially in the evening, he could shoulder a gun and patrol his aqueduct lines, which he has to protect as metropolitan district commissioner.

E. C. Jacobs, professor of geology and mineralogy at the University of Vermont and also state geologist, attended the meeting of the Geological Society of America in Boston during the first part

1896 Continued

of the week of December 29. The meeting was concluded on the very last day of the year, and thus the Secretary had the great pleasure of having Jacobs as an overnight guest at his home in Brookline. Being New Year's Eve, the occasion was rather special. The bright lights of downtown Boston had no allure for either of them, so a happy, quiet, comfortable evening of talk and good cheer was spent as we awaited the coming of the new year, which we saluted with proper ceremony. Then we went off to bed, because Jacobs had to get back to his job in Burlington the next day.

Further information has been received about our classmate, John L. Coley, who died on March 26, 1941. He had held various positions. He was efficiency engineer at the Baldwin Locomotive plant in Portland, Maine. He introduced high-speed steel into various Union Pacific Railroad shops as far west as Denver. He was master mechanic of the plant of the Babcock and Wilcox Company in Pittsburgh, Pa. In more recent years, in order to be nearer his parents, he went to New Britain, Conn., first with the Corbin Motor Vehicle Corporation and later with the New Britain Machine Company. For a few years prior to his death he had been retired and was living with his parents in Westport, Conn. He is survived by his widow, Ethel R. Coley, and two sons, William L. of Westport, and John R. of Chicago, Ill. — CHARLES E. LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

1898

On December 18, Howard L. Bodwell wrote from 644 Bon Air Street, LaJolla, Calif.: "This town, about fourteen miles north of San Diego, is populated mostly by retired people who have come here to visit and who liked it so well that they took up permanent residence. We intended to stay until next June, and we still do, unless these troublous conditions get much worse. I retired last April after 39½ years of service with the United States Steel Corporation and had looked forward to a good long vacation. This war may change things, however, and, since I enjoy perfect health, I may get into the struggle in some way. I am sure I could be of some use to the government. We left Vandergrift, Pa., on August 12 and arrived here on October 1 after an extended automobile tour covering most of the parks and larger cities in the Northwest. We visited Banff, Lake Louise, Jasper Park, Victoria, and Vancouver in Canada, and thence traveled down the West Coast to San Diego.

"Our younger son, Harrison, works for the Consolidated Aircraft Corporation and is living with us. Our other son, Howard, Jr., is with United States Steel and lives in Pittsburgh. We still maintain our home in Vandergrift and shall return there, but we do not contemplate spending any more winters in Pennsylvania. In the summer, Vandergrift is as good a place as you could find anywhere, and

that is where our friends live. We have lived there for 33 years and should have a hard time to find another place, regardless of climate, where we would be sure to be content permanently."

During December and January, the Secretary made a series of speaking engagements to sections of the American Chemical Society in the South Atlantic states — an excuse for himself and Mrs. Blanchard to go to a warmer climate. At Lake Wales, Fla., I called up Roger Babson on December 15 and found that he was at a hotel, having just arrived from the North, and had not been out to his home in Mountain Lake Park. Roger got in our car and directed us to the private entrance to the park, where he instructed the gate man to admit us at any time. This lovely park, which includes the Bok Singing Tower and Mountain Lake Sanctuary, embraces about sixty very beautiful homes, a club house, a lovely lake, and a golf course. Roger's own home sits on the slope above the lake and is just below the Bok tower, about three miles north of the center of Lake Wales village. Eight miles south of the village is Babson Park, the seat of Webber College.

One afternoon, Roger called for us and drove us to Babson Park, where we had dinner at the college with the faculty and that part of the student body which had not left for the Christmas holidays. This was Roger's first appearance at the college, for the school year, and he made a short speech before dinner: Webber College was founded by Mrs. Babson and serves for young women a function similar to that which Babson Institute at Babson Park, Wellesley Hills, Mass., serves for men. Webber instructs women in general cultural subjects and in finance and the care and management of property. When Babson first came to Florida the region south of Lake Wales was a wilderness, but now a fine state road extends through Babson Park to south central Florida. The college is beautifully located on the shore of Lake Caloosa. Just beyond the college and also on the shore of the lake is a fine real estate development with a hotel, beautifully landscaped roads, and attractive residences. The surrounding region is now full of citrus groves. Roger said that when he came to Florida he decided against investing in citrus crops. Instead he went into ranching. As we drove east from Lake Wales to Vero Beach, we passed across his ranch, which extended for several miles on either side of the road, and we saw many of his beef cattle grazing.

New addresses recently received are as follows: Dr. Joseph G. Coffin, 45 Mill Road, Vincentown, N.J.; Lyman F. Hewins, 1306 Gallatin Street, Northwest, Washington, D.C.; James F. Muhlig, 1008 Magnolia Avenue, Norfolk, Va.

We are saddened to have to report the death of three well-remembered classmates: Paul Clifford, II, of 186 Summer Street, Boston, who died on December 16; William Kelley, V, 656 North Cahuenga Boulevard, Los Angeles, Calif., on No-

vember 10; and Walter C. Watrous, IV, on December 1. — ARTHUR A. BLANCHARD, *Secretary*, Room 6-421, M.I.T., Cambridge, Mass.

1900

Mr. and Mrs. Edward Everett Bugbee have announced the marriage of their daughter, Barbara Duncklee, to Robert Laurence Spooner on Saturday, December 6, in Brookline, Mass. — Season's greetings were received from Wastcoat, Patch, Hapgood, Draper, Howe, Hart, Charlie Smith, Crowell, and Allen. Thanks a lot. — If we can believe the Newton papers, Mr. and Mrs. Arthur C. Walworth are at Fort Myers, Fla., for the winter. — Hapgood writes from Florida that he has a lot of company business with him, so he expects to be busy while he basks in the southern sun. — Early in December, Jim Batcheller dropped in to say au revoir till next summer, when he hopes to be back here again. Jim is recovering from his recent illness and looks much better.

Bob Blair writes that he is busy with his briefs but not too busy to prevent his having lunch with a classmate if one looks in at his sanctum. — A nice letter from Woodward in way-off Alabama tells of his spending a good part of his time at his shooting camp. Otherwise, he is busy with the iron company. — Besides those mentioned, the following classmates have been seen or heard from since the last installment: Newhall, Burns, Ingalls, Fitch, Stearns, and Russell. Each wanted to be remembered to all members of the Class.

Recent changes of address are as follows: Raymond D. Borden, Post Office Box 543, Hopkinton, N.H.; Charles M. Carpenter, 5134 Tuxedo Avenue, Detroit, Mich.; Lieutenant Colonel Milton W. Hall, 445 Garden Street, Iowa City, Iowa; Archibald R. Holmes, 877 Avenue Road, Toronto, Ontario, Canada; George W. Pigman, 1201 Jefferson Avenue, New Orleans, La.; Ralph Root, Pep Manufacturing Company, Inc., 33 West 42d Street, New York, N.Y. — C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston, Mass.

1904

The following clipping from the *Mining Journal* of December 30 gives us some information about Ralph Hayden: "Recently transferred from the closed-down Walker Mining Company in California, Ralph Hayden has been appointed mill superintendent of the Copper Canyon property of the International Smelting and Refining Company at Battle Mountain, Nevada. The 350-ton plant is under construction and will be ready for production shortly after January 1, 1942.

"Hayden had supervised the 1,600-ton flotation mill at the Walker mines for the past year and for over five years before that was assistant mill superintendent. He is a graduate of . . . Technology . . . and spent the 10 years following graduation with the Anaconda Copper Mining Company. The next 16 years he was employed by the Quincy Mining

1904 Continued

Company at Hubbell, Michigan. In 1935 he returned to the West and was employed by the Walker Mining Company which, like International, is an Anaconda affiliate."

Gene Russell reports that during the Christmas holidays he met Oscar Thurlow on the street. Oscar was well and looking prosperous and was about to return to Birmingham, Ala. — We hope to be able to hold our usual reunion on June 26, 27, and 28, and maintain the continuous record of reunions held since 1919. Further information on this subject will be forthcoming later. — HENRY W. STEVENS, Secretary, 12 Garrison Street, Chestnut Hill, Mass. AMASA M. HOLCOMBE, Assistant Secretary, 428 Munsey Building, Washington, D.C.

1906

A note from the Boston *Herald* of December 7 tells us that: "Mr. and Mrs. George S. Tompkins of Winchester announce the engagement of their daughter Miss Frances E. Tompkins, to Mr. Floyd M. Fuller of Bethlehem, Pa. Miss Tompkins was graduated from Skidmore College, attended Cornell University, and is now head dietician of St. Luke's Hospital, Bethlehem, Pa."

The Christmas season brought from classmates the usual welcome Christmas cards which the Secretary and Mrs. Kidder received with much interest and appreciation. — Occasionally, a business card of interest to classmates is received. Two have come in lately. One was the annual New Year's greeting from Fay, Spofford and Thorndike, consulting engineers of Boston, in which organization Carroll Farwell is a member of the firm. Incidentally, Carroll is president of the northeastern section of the American Society of Civil Engineers. The second card was from David D. Eames and reads as follows: "Marking Thirty-Five Years' Engineering Experience including the completion of Ten Years in the Private Practice of My Profession — D. D. Eames, Consulting Engineer, 739 Boylston Street, Boston — Steam and Power Reports — Design and Supervision of Construction of Industrial and Institutional Power Plants — Industrial Heating — In Appreciation of and Soliciting the Continued Friendly Cooperation of My Business Acquaintances, Old and New — 1906 — 1932 — 1942." — Stanley M. Ginsburg '38, son of our classmate Henry, was married on Thursday, January 15, at Brookline, Mass., to Elinore Ruth Weiss of that town. — The latest address of Lieutenant Colonel George F. Hobson is care of the Quartermaster School, Camp Lee, Va. — Notice has been received of the death on June 18 of Frank R. Ingalsbe, III.

To date we have not heard much from the Florida contingent. I saw Abe Sherman on the street in Boston recently, and he told me he was going to Sarasota for three months. — JAMES W. KIDDER, Secretary, Room 801, 50 Oliver Street, Boston, Mass. EDWARD B. ROWE, Assistant Secretary, 11 Cushing Road, Wellesley Hills, Mass.

1907

Friday evening, January 23, at Walker Memorial, the usual midwinter dinner of '07 men near Boston was held, with sixteen present: Bob Albro, Lawrie Allen, Dick Ashenden, Lester Brock, Howard Chase, Bill Coffin, George Crane, Ellis Doucette, Ralph N. Hall, Ed Lee, Alexander Macomber, Ed Moreland, Peabo, Don Robbins, Oscar Starkweather, and Stanley Wires. Harold Wonson was unable to be present because even now his health is not all that it should be, and the Secretary could not attend because he is now working in Whitinsville, Mass., for Whitin Machine Works, under Phil Walker '07, maintenance engineer. By telephone I learned from Peabo that the affair was a success, with the inevitable good fellowship, a first-class dinner served by the Technology dining service, and an interesting talk by Ed Moreland about new developments at the Institute in buildings, equipment, and courses, with special reference to the part being played in the defense program.

Clifford Allbright, architect, now has his office at 137 Newbury Street, Boston. — In the Worcester, Mass., evening *Gazette* of January 17 appeared a cut of Pliny Allen, age 19, son of classmate Charlie Allen of Spencer, Mass., with a comment to the effect that the boy had enlisted in the United States Army Air Corps and had left for Jefferson Barracks, Mo. — Lawrie Allen's son, Lawrence, Jr., became the father of a daughter, Julia White, on January 16. Robert Emory Chaffee, ensign son of Mrs. Marie K. Chaffee and Professor E. Leon Chaffee, was married on Christmas Night at the Eliot Congregational Church in Roxbury, Mass., to Anne M. Getchell of Dorchester. Leon is professor of physics and director of Cruft Laboratory at Harvard University. He wrote me briefly in January saying that he was recovering from a second operation for a detached retina.

From a letter written to Harold Wonson on January 1 by Kenneth Chipman, who is in charge of topographical work of the Canadian Geological Survey, Ottawa, Ontario, Canada, I quote in part: "The 1937 reunion was such a good time that it was my intention not to miss any future ones. . . . I can't say what I'll do for next June. I see Tylee (supervisor of overhaul and repair, aircraft branch, Department of Munitions and Supply) frequently, and Howe (Canadian Minister of Munitions and Supply) occasionally. We may be able to work out something together. . . . I think my golf has improved, and I'd like to show you and Lawrie Allen and Roy Lindsay what I can do now. Also, and perhaps more important, there has been too much work here for the last year or two and not enough association with old friends. I have thoroughly enjoyed having Tylee in Ottawa (he is doing a grand job), and seeing him does bring home the thought that it would be good to see more of the old bunch." To my mind, classmates, Kenneth expresses exactly a fundamental

reason why we should carry on our plans for our 35-year reunion, June 5 to 8, in spite of war and unsettled conditions.

From the New York *World-Telegram* of November 27 we learn that: "Frederic G. Coburn of New York prepared to-day to resign as chairman of the board of McLellan Stores Company to accept the presidency of Air Associates, Inc., airplane-parts firm. Mr. Coburn, a resident of Hewlett, Long Island, is widely experienced in the airplane field. A graduate of the United States Naval Academy and . . . Technology [Course XIII-A with '07, S.M. in 1908], he did engineering work in several navy yards and during the World War managed the naval aircraft factory in Philadelphia. Former president of the Aviation Corporation, American Airways, he was associated with the National Aviation Corporation and the American Airplane & Engineering Corporation."

I was pleased to receive on January 15 a letter from James A. McElroy. Five of the first ten years after leaving the Institute in 1907 he spent in the employ of private firms, and from 1910 to 1915 was a division engineer in the Connecticut State Highway Department. From 1918 to 1930 he was city engineer in Bridgeport, Conn. During the next five years he was in private practice in Bridgeport and in 1935 was appointed Fairfield County engineer for the W.P.A. and in 1937 chief civil engineer for the Connecticut Department of Public Works. In July, 1941, he was appointed by Governor Hurley to the State Board of Registration for Professional Engineers and Land Surveyors, where he is one of five members, and is also state director of Connecticut and Rhode Island Public Work Reserve. James attended Georgetown University from 1899 to 1902, receiving his A.B. degree there. His wife and three children are all living. The older daughter, 21, is a dental hygienist, having been graduated from the Guggenheim school for dental hygienists in New York. The other daughter, 19, is now attending the Katharine Gibbs School in New York. The son, nearly 15, attends high school in Hartford, Conn. The family home is at 386 Farmington Avenue, Hartford, but James's mailing address is 410 Asylum Street, Hartford.

Marcellus Rambo, dentist with office address Avenida Rio Branco, 257, Caixa Postal, 780, Rio de Janeiro, Brazil, S. A., wrote a note dated November 22 to Harold Wonson: ". . . I was in Boston for two days in October, 1940. Tried to find Bryant Nichols there but did not succeed. Looked over the Institute. What a different place from that of our day! Wonder if the students work as we did. Was in Washington in December, 1940, and found Denmark very ill. Three days afterward he died. I did not get to see either Fales or Thayer on this trip. We hope to go again in the next two years. A good many years ago Peabody was here with his wife. Ran into Parker Dodge in Washington in 1936. Other than these I have not seen any of our classmates. . . ." — Andrew P. Rebori

1907 Continued

'39, only son of our classmate Andrew N. Rebori, was married on December 20 to Barbara Willson in St. James Church in Dundee, Ill. The young man is a lieutenant in the United States Army Air Corps stationed at the Chicago Municipal Airport.

Gilbert Small, senior partner in the Boston firm of consulting engineers, J. R. Worcester and Company, in sending me his regrets at not being able to attend the January 23 class dinner, said: "I'm mighty sorry that a sudden trip to Washington on one of our various navy projects prevents me from being in Boston. . . . Ever since the oil pipe-line job from Portland, Maine, to Montreal, we have had just a bit more than we can do with comfort."

Remember, only three more months until June 5 to 8 and our 35-year reunion at Oyster Harbors Club, Osterville, Mass. Read Kenneth Chipman's comments again. If you have been, and are now, working overtime, absorbed in business, think how much more efficient you will be after next June 10 if you get away from it all for a few days previous to that date for real "re-creation", and association with old friends. Make our slogan yours: "I must plan to go." — BRYANT NICHOLS, *Secretary*, 126 Charles Street, Auburndale, Mass. HAROLD S. WILSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1908

The second dinner and meeting of the Class for the 1941-1942 season was held at the University Club on Tuesday, January 20. The following classmates were present: Jeff Beede, Bill Booth, Nick Carter, Cookie, Myron Davis, Paul Esten, George Freethy, Pop Gerrish, Harold Gurney, Winch Heath, Stiles Kedy, Linc Mayo, Linc Soule, and Joe Wattles. George Belcher, who usually comes to our meetings, was busy working on the United War Fund drive, while Mat Porosky and Henry Sewall were in Washington. — After dinner Myron Davis showed some very fine Kodachrome stills taken on trips to Cape Breton Island, Nantucket, and the Arnold Arboretum. He also showed pictures of his cousin, Bette Davis, taken at her summer home in New Hampshire. Cookie's pictures acquired on a Caribbean Sea trip and some interior views taken by Gurney were much appreciated.

We were glad to get the following letter from Harry Bentley but were sorry to hear the first part of his news: "On December 6 Aram Torossian, IV, died at his home at 1800 San Lorenzo Avenue, Berkeley, Calif. He leaves a wife, who has just written me, and a son. For a number of years he had been on the architectural staff of the University of California."

"I see in the January Review that Myron Davis has revealed to you that I am in the nation's capital. I am truly ashamed that I have not been more communicative. I read the '08 news every month with interest, and wish that I were near enough to drop in occasionally at the gatherings of the Old Faithfuls who

live in and near Boston. I should like to bring my alto recorder and play a duet for the crowd, provided Myron brings his tenor recorder to keep the performance from being a solo. We made some sweet music together when Myron was here at Thanksgiving. Between you and me, my wind was a trifle better than Myron's."

"Please . . . tell Cookie that I never eat a fried scallop without thinking of him, Hyannis, and auld lang syne. If any of you come to Washington, I hope you'll look me up at the United States Housing Authority in North Interior Building. Good luck!"

Joe Wattles' daughter, Priscilla, was married on December 27 to Treadwell Ruml at the home of her parents. She was graduated from Milton Academy and Pine Manor Junior College. Mr. Ruml was graduated from Harvard and is now attached to the 113th Division, Fort Dix, N.J. — The engagement of Justin Savage of Keene, N.H., to J. Grover Beede, son of Jeff Beede, has been announced. The bridegroom-to-be is at present connected with the Niles Bement and Pond Company at West Hartford, Conn. — G. C. Westervelt is vice-president and general manager of the Houston Shipbuilding Corporation on Irish Bend Island on the Houston Ship Canal. His concern is turning out large steel cargo-ships for the Maritime Commission.

At the next dinner and meeting of the Class, to be held on March 10, we are planning to entertain sons of '08 who are students at Technology this year. We find that the following are registered: Russell W. Brown '42, George F. Kenison '42, Alfred B. Babcock, Jr., '43, Waldo F. Davis, Jr., '43, Henry D. Ferris '43, Richard L. Carter '44, James B. Angell '45, Gordon P. Caldwell '45, James L. Gurney '45, and Leavitt J. Pope '45. The usual notices will be sent out, but plan to attend and meet the sons of '08.

We have the following changes of address to report: Paul H. Heimer, 10 Harding Road, Glen Rock, N.J.; Alfred R. Hunter, 12 Brenway Drive, West Hartford, Conn.; John E. Johnson, United States Department of Agriculture, Office 329, United States Court House, Kansas City, Mo.; Richard Y. Kennard, care of Parker Hotel, Texarkana, Texas; Reverend William G. Logue, S.J., Boston College, Chestnut Hill, Mass.; Rolando A. Martinez, San Rafael, 106 Altos, Havana, Cuba; Charles W. Morrison, Cross and Brown Company, Appraisal Department, 270 Madison Avenue, New York, N.Y.; Joseph G. Reid, 1437 25th Place, South, Birmingham, Ala.; Roger C. Rice, Box 529, Los Banos, Calif. — H. LESTON CARTER, *Secretary*, 60 Battery-march, Boston, Mass.

1909

Paul Wiswall writes: "At the New York class luncheon on January 10, seventeen of our classmates were on hand to see movies that Chet Pope had taken in South America and to hear him tell of some of the experiences that he and Marcia had had on their several trips

south. Chet is pretty canny. Sure, he goes to Brazil and Argentina to sell his excellent printing inks. But since all work and no sight-seeing might make things a bit tiresome, along goes Marcia and that well-conditioned movie camera which, in Chet's capable hands, is said to be able to lie down and roll over whenever he says the word. However that may be, such color films as we saw gave us one of our most entertaining class luncheons. This last trip took Chet and his wife on a polished streamline train to a mountain resort in (I vow I am right, too) Patagonia, and the hotel and its grounds were so beautiful that I myself want to get down there one of these days.

"George Gray was back in our midst after a pretty long sojourn in Massachusetts — first at Holyoke and later at Belmont. He's with his old firm, International Telephone and Telegraph Corporation. — Bob Doane is also back at his old stamping ground with the Anaconda Wire and Cable Company at Hastings-on-Hudson, N.Y. Bob writes an interesting letter about some of the things going on at the plant and mentions frequencies of 600,000,000 (he writes that prodigious number as 'six hundred million') cycles a second. That's too many for me in Course V. Please call for someone from Course VI! Bob's son, Duncan, is in the South and, I think, still with the Seventh Regiment (New York). He went down with the regiment almost a year ago as a private and is now staff sergeant."

"The newspapers make decidedly interesting reading — maybe too interesting — to one who spent six months up and down the Asia Coast some years ago. In the New York Times one morning was a map of Manila and Manila Bay. Corregidor, our most heavily fortified Philippine fortress, lies like a small lamb chop between the jaws of a huge dog. On the north tip of the mainland is a beautiful mountain, called Mariveles, and under the mountain on this map is a tiny bay in the lee of Cochinos Point. In that bay on Christmas night, 1919, on a poor old ship — called the *Shinfoo* — that flew the five-striped flag of the Chinese Republic, I ate a sumptuous dinner. The *pièce de résistance* was turkey that had been fattened in a stateroom across from the one I paid for but did not occupy. Those turkeys were not altogether to blame for the nonoccupancy, for the room was too stuffy and hot for comfort. I still recall measuring the only porthole. It was just under six inches in diameter, and I had come aboard at Singapore, which is eighty miles north of the equator! Yes, the deck was far more salubrious than that steamy, smelly cabin."

"Another map in the same Times mentions Balikpapan. That oil port almost under the equator on the east coast of Borneo was my first stop in the Dutch East Indies. Balikpapan is a little place where the Batavia Petroleum Company, part of the Shell family, had a refinery and shipping point. There was a tram on the main street, and one rode free of charge. That was one of the services that the oil company gave its employees."

1909 Continued

The club, and a very comfortable one, too, was beside the water and provided a tight stockade to keep sharks and alligators from molesting the swimmers. We took on enough oil in that part to drive our sturdy Dutch freighter all the way to San Francisco and back.

"But I think the most interesting recollection I have of Balikpapan was the clothing I saw worn there. We unloaded a huge amount of pipe — big stuff for the oil pipe lines. The roustabouts on the dock were new to me. They were tall, rawboned, brown Indian coolies, and they wore sarongs instead of trousers. During the afternoon some Chinese women wandered past. They were nicely dressed in the conventional pajamalike costume of the well-to-do Chinese ladies. I wrote friends that I was sure I was a long way from home. I was in a place where the men wore skirts and the women affected pants! All of which leads me to conclude by saying that there is nothing like travel to add zest to the reading of the newspapers." — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. *Assistant Secretaries*: PAUL M. WISWALL, MAURICE R. SCHARFF, New York; GEORGE E. WALLIS, Chicago.

1910

Since the last five-year reunion, the class treasury has had a balance which, in the opinion of your Secretary was serving no sound purpose. Therefore, when a request for funds came from the Advisory Council on Athletics, your Secretary thought that some of this balance would serve a very worthy cause, and he wrote a check for \$20 for this fund. He hopes that the Class will endorse his action.

A belated note has been received telling of the death of Manuel V. Muriel in January, 1941. — J. Theodore Whitney, who held a reserve commission, has been called to military service with the rank of major. Harold W. Churchill and Frederick Stover are lieutenant colonels in the Army.

Luther Davis who works for Haffenreffer and Company, Inc., in Boston, has a son at Technology who expects to be graduated this year. — When the Secretary was in New York recently he met William Arkell. Bill looks the same as he did at Tech, although he weighs more now. We had a pleasant time reviewing experiences at the Institute and our lives since 1910. He is now in the grandfather class, which most members are rapidly joining.

Louis French has announced the marriage of his daughters, Ruth to Albert Cristell of New York City and Barbara to George F. McClellan of Clewiston, Fla. — Charles E. Greene has announced the engagement of his daughter Eleanor to Winslow Smith of Chicago. — HERBERT S. CLEVERDON '10, *Secretary*, 46 Cornhill, Boston, Mass.

1911

Remember that six-months-old little girl who accompanied Sara and me to our ten-year reunion at Mayflower Inn,

Plymouth, in June, 1921? Of course she's now twenty-one, and on the night after Christmas, in a quiet family wedding at All Saints' Episcopal Church, Worcester, she became Mrs. Peter Barton. Her husband, the son of Mr. and Mrs. George Sumner Barton of Boylston, formerly of Worcester, is assistant to the general foreman at Rice, Barton and Fales, paper-machinery manufacturers here in Worcester. The Peter Bartons now are residing in Elm Park Manor, 60 Elm Street, Worcester.

Another '11 bachelor has succumbed. In October, Art Coupal, II, married Grace L. McKenney, and in response to a query, Art says: "We are now living in a small but comfortable home at 30 Norwiche Road, Needham, Mass. To me, Needham seems to be a lively and model community." May the future have much of happiness and prosperity for both these newlywed couples!

The "Observant Citizen" in the Boston Post recently said: "A special three-man committee on defense education has been formed by President Carl S. Ell at Northeastern University to co-ordinate all courses and programmes of an educational nature arising from the present national emergency." Our Carl is right on the ball all the time. "Observant Citizen" adds: "For the past two years Northeastern has been co-operating with the federal government in giving special defense courses."

Speaking of national defense, Alec Yereance, I, sent me one of Boake Carter's syndicated releases appearing in the Boston Globe on January 6. Discussing "Live Leadership in Control of Our Air Force," Carter classes George Kenney, I, our Brigadier General, as "one of the real students of what constitutes a modern 'air theatre of war.'"

Replying to a letter entitled, "Maximum Output in Six Days," Ted Van Tassel, X, had a sensible plan published in the Boston Sunday Herald recently: "In production there are two factors of primary importance: the industrial plant and the supply of labor. There has been no proposal on the part of any sensible individual to work any laborer more than six days in any one week. But there is no reason why the industrial plant should remain idle one day out of seven, when, by an intelligent stagger shift system, labor could operate it to provide maximum output, without any individual worker spending more than six consecutive days working. In that case there is no reason why the worker should get more tired than under normal one-shift six-day production and output vitally needed could be greatly increased. I hope this clarifies the distinction between six days work for men and 168 hours per week for machinery."

Our '11 colony in Florida seems to have doubled as 1941 bowed out, for two address change slips from the Alumni Office showed that Lewis Baxter, IV, formerly of New York, is now located on San Juan Drive in Ponte Vedra Beach, while Alanson Palmer, V, former manufacturers' agent in Columbus, Ohio, is

now located at Chasco Inn, New Port Richey, just above Tarpon Springs. Already located in Florida for a number of years are Norman DeForest, III, grower and shipper of citrus fruits, and Jim Carpenter, I, Home Owners' Loan Corporation representative. DeForest's packing house is on United States Route 17 at Maitland, near Orlando, while Carpenter operates in Miami and lives at 3081 Indiana Street, Coconut Grove.

From M.I.T. we learn that Emmons Whitcomb, X, former northeast district traffic manager for United Air Lines, joined the Institute's staff on January 15 to handle the Office of Production Management priority regulation in the bursar's office, succeeding Carl M. Peterson who has been called into the Army as a lieutenant.

Dissa and datta: Fred Daniels, VI, has been re-elected vice-president of the Worcester Chamber of Commerce. — Laurence Watts, I, has been advanced from lieutenant colonel to colonel and assigned to Signal Corps Headquarters, Quarry Heights, Canal Zone. — Osborne Shensstone, I, for years in Toronto as director of research for Massey Harris Company, Ltd., was transferred to Detroit in June. Now another address change comes through, placing him at 1411 Ruddiman Avenue, Muskegon, Mich. — Charles Williams, V, retired bigwig for Thomas A. Edison, Inc., has given up his Short Hills, N.J., home, and his mailing address is now Post Office Box 36, Friendship, Maine. — Julian Gravely, V, for many years manufacturing manager for Continental Can Company, Inc., at Baltimore, is now at 607 Summit Street, Alton, Ill. — George Watson, IV, still operating in Houston, Texas, is now located at 2403 Del Monte Drive. Cheerio! — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Worcester, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford, Mass.

1914

Apparently '14 men are all too busy to think of class notes. Several of our mates have been written to by your Secretary when address changes or other items had been noted, but not a single reply has been received. This comes close to a new low — even for war times. How about a note to Charlie Fiske or Rich right now?

How many '14 men are reserve officers? Norman MacLeod is a lieutenant colonel of Field Artillery and Harold Wilkins is a captain in the Chemical Warfare Service. Both were ordered to duty, but before the designated date they were temporarily deferred because they were already doing important war production work. Your Secretary would greatly appreciate hearing of classmates who have entered the services. Bill Lucas, a lieutenant colonel with the Infantry of the regular Army, must be on the move. His address has been changed from the East to Los Angeles. Assignment details are no longer published.

It is not news when patents are issued to Ed Wentz. Hardly a month passes that his name does not appear among the in-

1914 Continued

ventors on the list of new patents granted. The latest your Secretary has noted is an arrangement for a light valve associated with sound recording. — Watch The Review for Alumni Day plans. Graduation has been changed from June to April 27 and will have a direct bearing on plans for Alumni Day and for our annual pre-dinner meeting. — H. B. RICHMOND, Secretary, General Radio Company, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, Assistant Secretary, 1775 Broadway, New York, N.Y.

1915

According to the latest count on class dues, 119 men paid \$480, and thus 25 per cent of the Class contributed an average of \$4.07 a man. The splendid and remarkable showing shattered all previous records and established a new high for class dues collections. My thanks to you all!

Trials and tribulations of a Class Secretary! Read Larry Landers' reprimanding letter: "I was shocked no end when I noticed the error in spelling of the word 'aniline' (page XXXII, column 2, second paragraph) in the November Review, in which you refer to your visit with Ben Lapp in Buffalo and say that he has charge of production of dyes at the National Aniline and Chemical Company. I can forgive you for forgetting the chemical formula of this product, but I shall never forgive you for misspelling aniline. I hope that some of our competitive classes will not notice this error, which, I hope, was typographical."

Frank Foster has been transferred to the southern territory for Samuel Cabot, Inc., and from down south writes: "I thought when I got this far away I would be out of your reach, but you are worse than the Canadian Mounties. I have just finished drying my tears away after reading your sob letter, however, and am enclosing a check. By the way you concentrate on me, a body would think I was one of the successful members of the Class. I appreciate the honor but hope you are not misinformed. Recently I met an architect classmate (Louis P. Smithey) in Roanoke. At school I did not know him but he is very agreeable. Later I learned that he was considered about the best architect in that particular section. I'm enjoying my trip in this part of the country. Give my regards to Papa Rooney when you see him." A nice letter, Frank!

Bill Holway from Tulsa, Okla., says: "We are engaged now in building the transmission lines and substations for the \$25,000,000 Pensacola Dam hydroelectric project in northeastern Oklahoma. My organization has also been making the plans for the Cookson Hills cantonment in Oklahoma, which is not going to be built at the present time. My older son, who was married this summer, is completing his graduate work in the Course in Electrical Engineering at the Institute. My younger son is a junior in Civil Engineering, and my daughter's husband is connected with a national defense laboratory for physics research at the Institute, so I feel that I still have considerable connection there."

Jim Tobey of New York City, as busy as ever with as many activities, enclosed a check for class dues with the news: "I am not yet in the Army, at least not on active duty, but I have been rather busy with many national defense activities. Among other things, I am instructor in the extension school of the Second Military Area, a job which involves correcting a lot of lessons done by reserve officers in their correspondence courses. I am also serving as chairman of the national defense committee of the Institute of Food Technologists and as technical adviser to the committee on food and nutrition of the National Research Council. These duties have required a good deal of running back and forth to Washington. Come in and see me the next time you are in New York. When you are here, I will entertain you by taking you to lunch at the Harvard Club, of which, believe it or not, I am now a member."

Lloyd Chellman, 1954 Columbia Road, Northwest, Washington, D.C., wrote: "I was glad to get the personal note enclosed with the general 'Help Azel' letter asking for class dues. Your subtle use of a sucker list has been effective in the past, I understand, and the enclosed check is my small part in keeping it so. I have had a few changes in my business and family affairs. As you know, I was in the New York regional office of the Public Works Administration, but on December 1, 1940, that office was closed and four of us were transferred to the central office in Washington. In February of this year, I went with the War Department as supervising constructing quartermaster on all shell-loading plants being built for the Ordnance Department. Ten such plants are now under construction at a total cost of about \$370,000,000 — which isn't peanuts in any country! Regardless of newspaper criticism and in spite of the red tape which appears to be necessary, five of these plants which started from a barren waste last November are now producing loaded shells and bombs and will be ready for complete production soon. Construction on the other five has recently started."

"My son is working in the production department of the Todd Shipyards Corporation in South Portland, Maine, and the eighteen-year-old daughter is in her freshman year at Colby College in Waterville, Maine, so that while our entire family is quite a distance from home, we are living within 80 miles of each other. My daughter is happy to get back to New England and appears to be having a wonderful time. I am wondering if she has taken too literally my chance remark that a college education consists of more than acquiring knowledge from books. My best wishes to the best Secretary any Class ever had." Thanks for the last line, Lloyd, but especially for the very interesting letter.

Good Kebe Toabe from Elizabeth, N.J., wrote: "I now have to pay tuition and other expenses for my youngest son, who is in the class of '45 at the University of Wisconsin; and boy, are his bills big! The M.I.T. Club of Northern New Jersey has appointed me regional chairman in

the Elizabeth area. We are quite active here with social affairs. The Tech men of Elizabeth are finally getting together, and they seem to like it. Louie Zepfler, who lives in our neighborhood, is also quite active in local alumni affairs. If you ever get to Elizabeth, do stop in and Mrs. Toabe and I will give you a real warm welcome." Thanks to the Toabes, I am looking forward to an evening with them.

Louis Zepfler from Cranford, N.J., wrote: "What better way to start the New Year than with a letter to you enclosing my dues and a little news? Mrs. Zepfler ('Leila to you,' she says) and I were in Florida this fall. You will appreciate my delay in writing you when I tell you we also burst our budget by flying to Havana. Upon our return we were engaged in organizing an M.I.T. Club of Union County, New Jersey. Kebe Toabe has been doing swell pioneer work for this new organization, which is an offshoot of the M.I.T. Club of Northern New Jersey. A very successful baseball game was held last summer. This fall we had an organizing dinner and in late November a bowling party. You will remember I always wanted to ring in the wives at our reunions. — Well, in this organization that idea went over with a bang. We have an organized auxiliary committee with Mrs. Zepfler as chairman and Mrs. Toabe on the committee. They planned a war relief supper dance and bridge at the Suburban Club for January 31, the proceeds to be donated to American Red Cross or the government. My old position as assistant general superintendent of the Eagle works, Standard Oil Company of New Jersey, was abolished in curtailment proceedings, but my company has made me steam and power engineer at the Bayway plant. My position has been improved by the move and the prospects are excellent."

Loyal Jerry Coldwell, flying around as usual, sent a check when he wrote me last November from Little Rock, Ark.: "We are building a fairly large detonator plant — about 15,000 people in each three shifts. If the work were simply construction, I'd be satisfied because I wouldn't be on it. I do no construction work. It so happens, however, that we also have to operate the plant, so I am in the midst of getting together the key organization. Lately I've had to spend a week here and a week in New York, but I hope that ratio will change for the better before very long. We have had quite a bit of rain lately, and the Arkansas River is quite high. Naturally it is full of mud, as are practically all of the rivers in this part of the country. The water looks pretty nasty from the bridges that we have to cross going out to the plant, which is about fifteen miles from town. Our construction crew do not care very much for the rain, because it makes pretty slippery going for the land-grading equipment, of which we have quite a lot. The site is about two miles wide and six or eight miles long. Quantities of dirt have to be moved around in that area!" Shortly after this letter was written Jerry went to England on a clip-

1915 Continued

per — certainly a most thrilling and interesting adventure.

Ray Stringfield wrote from Los Angeles: "We're beginning to feel pretty much in the war out here, with occasional black-outs, antiaircraft guns everywhere, and so on. My boy rushed off and joined the Navy as soon as war was declared. The training will do him good if he lives through the war. My two girls are still in school — one at the University of Southern California and the other in high school. I am still spending most of my time co-ordinating the defense training courses at U.S.C., where we now have over 2,000 students. In between times, I try to teach a little rubber technology and plastics and solve some of the troubles which the local defense industries have along those lines. I was lucky enough to get delivery on a new car on December 1. Hope they don't take it away from me."

These interesting letters provoke a comment on the splendid class feeling that prompts our men to write and a remark on how indicative the letters are of this present troubled wartime in which we are living. — After twenty-six years I have seen Ken Johnson! He has charge of mechanical engineering at the United States Finishing Company, Norwich, Conn. Ken looks and talks and acts the same, and I had a happy visit with him. — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline, Mass.

1916

Our versatile classmate Steve Whitney is chairman of the Republican town committee in Watertown, Mass.; his wife is in charge of building up a motor corps for the American Red Cross; and on top of all that the officers of the 208th Antiaircraft Battalion were quartered with him early in January of this year. We can all imagine what a wonderful host Steve was to the officers of the 208th during the short time they occupied quarters in his home. A friend of mine in that battalion wrote that the officers were nearly killed with kindness during their stay.

Walt Binger, who has been in England since our reunion last June, broke into print in a recent issue of the *Engineering News-Record*. Your Secretary just cannot keep up with the publicity that Walt is receiving these days. He has been appointed a member of the Visiting Committee on the Department of Civil and Sanitary Engineering at the Institute. Classmates will have to be very indulgent with Walt in connection with his assignment to get out our class history. He has had to put this work entirely aside for the duration. — On January 5 Sam Ellsworth announced his association with Howard M. Turner as consulting engineer with offices at 6 Beacon Street in Boston. Perhaps in exchange for this publicity Sam will give us a little dope for these columns in the near future.

From Chuck Loomis in Memphis, Tenn., your Secretary received a communication concerning Eddie Clarkson, who is a captain in the Coast Artillery Corps. As he wrote to Chuck, Eddie expects "to stay in the Army for the next

ten years." Among others who have felt the urge to get back into the service is Dave Patten, whom I saw in Boston on January 21. He has been thinking of doing his bit with the Army but feels he is not likely to be called. Hen Shepard, whom I saw in Boston on January 20, stated that he had obtained leave of absence from his firm and was trying to hook up again with the good old United States Navy for some sort of active service for the duration.

Bill Barrett, one of the big shots with the Metropolitan Life Insurance Company of New York, was the author of an article which appeared in the October issue of the *Eastern Underwriter*. His article described the development of industrial group life and accident insurance over the past thirty years. A footnote to the article indicated that Bill has been given additional responsibilities recently by Metropolitan, but we have not been able to discover any details of his promotion. Maurice Holland last November was appointed research adviser to the Pillsbury Flour Mills Company. For the past eighteen years Holland has been connected with the National Research Council as director of the division of engineering and industrial research. His activities in this capacity have taken him pretty much all over the United States and Europe. — JAMES A. BURBANK, *Secretary*, Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Coleman Brothers Corporation, 245 State Street, Boston, Mass.

1917

Ray Brooks is on the road to recovery from a recent complicated operation on his back. Those members of the Class who were at the December dinner meeting in Cambridge will be glad to see the following note from Ray: "Gentlemen of 1917, your telegram and your sumptuous basket of exotic goodies gave me a grand fillip toward return to the state of more intensive citizenship. Which means that both the surgeon and A.R.B. have confidence, this time, that the physical battle has been won. So, on to unfinished business, from World War I — on to a successful twenty-fifth reunion. (We are the darndest Class to attract Mars. I pray our fiftieth will be peaceful and uninterrupted.) Your kind thoughts will be with me to the last, and the titbits have given, and will continue to give, nostalgic bliss always caused, since little boyhood, by packages from S. S. Pierce Company. Kind agents of '17, Western Union, and S. S. Pierce have given me a huge dose of heart warming. Thank you, and thank you again!"

Bill Dennen, Colonel in the Coast Artillery Corps, writing from Fort Monroe, Va., to Win McNeill, said that he hoped to attend the reunion and that he had a son who would be graduated from the Institute this year. Bill further reported that Lucas Schoonmaker was also at Monroe and that C. Edward Atkinson was at Fort Eustis. (Ed was recently promoted to the rank of colonel, C.A.C.) Your Assistant Secretary would like to

add here a personal word of congratulation to these three officers of the Coast Artillery Corps whose early days as second lieutenants at Fort Monroe he shared in 1917. May the eagles multiply!

Kingsley Gillespie has been elected treasurer and general manager of the Stamford *Advocate's* corporation and editor-in-chief of the newspaper. For many years since leaving the Institute he has been with the Stamford Rubber Supply Company, of which he is now president. He is vice-president of the Stamford Chamber of Commerce, secretary of the town zoning commission, a director of the Y.M.C.A., member of the board of the Ferguson Library, and for many years has been a director of the Fairfield County Planning Association.

Our correspondent in Texas reports that Dud Bell arrived in those parts early in December; that he was, as ever, the life of the party — but that Dud's failure to address a meeting of the Technology Club of Northern Texas in Dallas on its invitation indicates that something has happened to him. Times have changed! Or do family responsibilities rest too heavily? — RAYMOND STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass. PHILIP E. HULBURD, *Assistant Secretary*, Phillips Exeter Academy, Exeter, N.H.

1918

Your Secretary received Christmas cards and notes from many members of the Class and their families. Enslo Dixon is still on the job at Port Arthur, Texas. From Wendell Kayser's family I find that he is in the technical division of the Chemical Warfare Service in Washington. His son, David, is in the training school for Annapolis in Norfolk. Donald W. MacArdle, a major, is now stationed at the Port of Embarkation in Brooklyn and is teaching defense courses at New York University evenings.

From the Alumni Office I received a release from the news bureau of the General Electric Company in Schenectady telling of the appointment of Elliott Harrington as manager of sales of the Schenectady induction motor section. The appointment became effective on December 15. Dick has been with the General Electric ever since he came out of the Army after World War I.

Will some of you fellows let me know how you feel about our going ahead with plans for a twenty-fifth reunion in June, 1943? If we are to proceed, we should not wait until the last minute. Some things should be done now. — GRETCHEN A. PALMER, *Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1919

The M.I.T. Alumni Fund for the year 1940-1941 showed that about 22 per cent, or 110 members, from the Class of 1919 contributed \$856.50, or an average of \$7.80. The average for the entire alumni body was just over 26 per cent of the Alumni, and the average contribution was \$8.17. Although this donation from our Class is an improvement over that of previous years, the number of contributors

1919 Continued

could definitely be increased. Members of the Class who receive The Review notes should solicit members who have not contributed to the Alumni Fund.

Leo E. Beaulieu, VI, is with the Beaulieu Electric Company, 225 Walnut Street, Holyoke, Mass. — Edward F. Deacon, IV, XV, has moved from Dallas, Texas, to 1501 North Fourth Street, Clinton, Iowa. — Frederick R. Hewes, I, has moved from Washington, D.C., to 1815 North Hartford Street, Arlington, Va. He was promoted to the rank of full commander in December. — James Holt, Associate Professor of Mechanical Engineering, was granted a leave of absence from the Institute in order that he might accept an assignment in defense work.

Leslie A. Jackson, XI, is with the Little Rock Municipal Water Works, Robinson Memorial Auditorium, Little Rock, Ark. Jackson has been active in the government defense project which the Lummus Company has been constructing near Little Rock for the production of ammonium picrate. — Leo A. Kelley, 3438 87th Street, Jackson Heights, N.Y., is a consulting engineer, is married, and has one son just past three years old. Leo's hobbies are astronomy, meteorology, and photography, and he travels occasionally around the eastern part of the country. He wrote: "I met Don Way on my return from Schenectady early in December. He sat across the aisle from me, and we talked about things in general. Congratulations on the fine Review notes. Keep it up. See you soon?"

Arthur C. Kenison, 4 Woodlawn Oval, Wellesley Hills, Mass., wrote that he is an insurance broker and has a wife and two daughters, 14 and 17. For recreation he drives across country and travels all over the United States. — Ervin M. Kenison writes from 2553 Collis Avenue, Huntington, W.Va., that he is a valuation engineer with the Texas Electric Service Company, Fort Worth, Texas. Ervin bowls for a hobby and is still improving his average. He writes that his work is summarizing and pricing reproduction costs for a subsidiary of Electric Bond and Share Company.

Harry A. Kuljian is a consulting engineer and lives at 207 Dupont Street, Ridley Park, Pa. He is married and has three children; the oldest one attends M.I.T. Harry travels considerably on many construction jobs and does not have much time for recreation, as he spends full time on work. He has not contacted any '19 men since last year. — R. G. Lafean has his biography in "America's Young Men."

Warren A. Maynard, 57 Oxford Street, Winchester, Mass., wrote that he is a telephone engineer and also is busy with civilian defense work and church. He is married and has two sons, 16 and 14, and spends time on photographs and gardening. Warren took a trip to the West Coast by automobile last year. — James R. Moore, 401 Wayland Avenue, Providence, R. I., is a cotton-yarn broker. He is married and has two daughters; the one who is 17 attends Lincoln School, and the other, 19, is at Lasell Junior College,

Auburndale, Mass. Moore is spending his spare time on priorities, is a member of the Technology Club of Rhode Island, and travels between New England and Georgia.

John J. Murphy was appointed manager of the Harvard Brewing Company's operations in metropolitan Boston in December. Murphy was formerly the president of one of the larger brewing companies of Boston. He is married and has five children. The Boston *Globe* says: "He is a member of the Knights of Columbus, Elks, Engineers Club, M.I.T. Alumni, Veterans of Foreign Wars, the American Legion, the New England Master Brewers Association and the National Master Brewers Association. In 1940-41 he served on the executive committee of the Massachusetts Brewers Association." The Class congratulate Murphy on his new appointment and wish him success in his assignment. The suggestion has been made that Murphy roll one of his kegs into our next class reunion.

Leon I. Snow, I, has moved from Newton Centre to 19 Longwood Avenue, Brookline, Mass. — Margaret Curry Wood has moved from Tiverton, R.I., to Old Bedford Road, North Westport, Mass. — Kenneth A. Wright, XV, is with the Johnson Service Company, 1905 Dunlap Street, Cincinnati, Ohio.

The Class appreciate the services of George W. McCreery, Class Agent for the Alumni Fund and our worthy Assistant Secretary. — EUGENE R. SMOLEY, *Secretary*, Lummus Company, 420 Lexington Avenue, New York, N.Y. GEORGE W. MCCREERY, *Assistant Secretary*, 131 Clarendon Street, Boston, Mass.

1921

Donald B. McGuire, VI, says that philately is still one of his strong hobbies, along with music and a well-stocked "tinker" shop. As a side line, he admits being production superintendent in charge of hydroelectric and steam generating plants of the Rockland Light and Power Company, Middletown, N.Y. Don originally went into the communications field with the American Telephone and Telegraph Company and then joined the staff of the Unadilla Valley Railroad. Boston lured him back, and he joined the Charles H. Tenney company before he went to Middletown. Donald, Jr., is now 17 years old, and Janice is 14. Coming back to stamp collecting, we discovered only last summer that Saint also shared our interest in stamps. How about the three of us swapping duplicates, Don?

Charles MacKinnon, II, is vice-treasurer of the Plymouth Cordage Company, Plymouth, Mass. Charlie received his master's degree at the Institute in 1923 and taught mechanical engineering at the Case School of Applied Science for a year. He then joined the Plymouth organization and became successively assistant superintendent, superintendent, and manufacturing manager, before taking up his present duties. Charlie has a daughter, Ellen, two years old.

Raymond A. Snow, II, also has a collecting hobby — books — and he sup-

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plements it with year-round golf in our home state of North Carolina. Ray is district manager of the Raleigh district of the Carolina Power and Light Company and has charge of operation and maintenance circuits as well as sales and customer service. He has been with the company since graduation, advancing from meter reader to clerk to purchasing agent, and, in 1936, to his present position. Ray is married and has two daughters, Josephine, thirteen, and Martha, who is eight years old.

Recent promotions in the United States Army have been announced for Holland L. Robb, I, and for Don G. Shingler, I. Holland has been made a lieutenant colonel. His address is Box 1108, Carmel, Calif. Don is now a colonel and is located in Washington, D.C., at 3433 Wisconsin Avenue, Northwest.

Harvey C. Allen, a brigadier general, who received his master's degree with the Class, is in the news as the head of Camp Hulen, Texas: General Allen had commanded the 13th Coast Artillery at Fort Barrancas, Fla., prior to his promotion to his present rank in 1940. He has given more than 30 years of service to the Army, for he received his original commission in the Coast Artillery in 1910 following graduation from the University of Vermont and State Agricultural College. He then served with units at various posts from New Hampshire to the Canal Zone. Following service in the Champagne-Marne, Aisne-Marne, St. Mihiel, and Meuse-Argonne offensives with the American Expeditionary Force, he returned to this country in 1919 to pursue technical research work of a military nature. He attended the Institute, the Advanced Coast Artillery School, the Command and General Staff School and the Army War College. He has a notable record for his technical development work as well as for general staff duty.

John Stahl Ferguson, X, passed away on January 1 after a brief illness. He had been a development engineer in the works laboratory of the General Electric Company, Schenectady, N.Y. John was born in Fort Wayne, Ind., in 1895 and prepared for the Institute at Andover and Dartmouth, joining us in his junior year. After graduate work at Boston College, he became chief chemist for the Haverhill Gas Light Company and then chief chemist for the gas company in Pawtucket until 1930, when he went to Schenectady. He was a member of the Masonic Lodge in Pawtucket. John leaves his mother, Mrs. Lorena Ferguson of Schenectady, and two children, John, Jr., and Jo Ann. On behalf of the Class, we extend sincerest sympathy.

George A. Chutter, VI-A, is sales manager of the electric furnace department of Hevi Duty Electric Company, 90 West Broadway, New York, and he makes his home in Glen Rock, N.J. He has three boys, Raymond, who is thirteen, Reinald, eleven, and Roger, two. — Glenn E. Fargo, IX-B, sports the title of president and general manager of Bradshaw Diehl Company, Huntington, W. Va., and confides that it is the leading

1921 Continued

department store in that section. Glenn really has gone in for this sort of thing in a big way. First he was graduated from the Harvard University School of Business Administration; then he became controller of Gladding's, Inc., a department store in Providence, R.I.; merchandise manager of Scruggs-Vandervoort-Barney, Inc., St. Louis; Denver Dry Goods Company, Denver; Broadway Department Store, Inc., Los Angeles; Lamson Brothers Company, Toledo; and finally in 1940 he went to West Virginia. Glenn, Jr., is ten years old, Lewis, eight, and Virginia, five.

The month's new addresses are: W. Robert Barker, XIV, 427 West 62d Street, Kansas City, Mo.; John W. Barriger, 3d, XV, 3611 Fulton Street, Northwest, Washington, D.C.; J. Morton Briggs, VI, Gamewell Company, 4105 Ovid Avenue, Des Moines, Iowa; Dr. John Campbell, XIV, 5401 Bewdley Road, Richmond, Va.; Christopher C. Carven, IV, 48-02 43d Street, Woodside, N.Y.; Orrin Champlain, Jr., III, 152 Westsylvania Street, Germantown, Pa.; John S. Cummings, VI, 708 Porter Street, Wichita, Kan.; John A. Facey, II, 16 Garland Terrace, Springfield, Mass.; Curtiss T. Gardner, I, 3714 Beech Avenue, Baltimore, Md.; Kenneth N. Goward, XV, 200 Parkview Avenue, Lowell, Mass.; Charles A. Hill, Jr., X, Indian Mount School, Lakeville, Conn.; Reginald W. King, VI, care of Edward Tietze, 912 Sorolla Avenue, Coral Gables, Fla.; Lt. Col. Raymond G. Moses, I, 2540 Massachusetts Avenue, Northwest, Washington, D.C.; Major David A. Newcomer, I, Corps of Engineers, United States Army, Headquarters, Engineer Replacement Training Center, Fort Belvoir, Va.; Harry M. Ramsay, XV, 818 Kimball Avenue, Westfield, N.J.; Arthur L. Silver, XV, Apartment 104, Vernon Manor, Cincinnati, Ohio; David L. Steidlitz, II, 4 Rowley Street, Rochester, N.Y.; Henry C. Taintor, II, Box 18, Harper, Iowa; Albert H. Tomlinson, X-A, 60 Plymouth Street, Montclair, N.J.; A. Royal Wood, VI-A, 12 Old Orchard Road, North Haven, Conn.

March winds, blow more news to your Secretaries. — RAYMOND A. ST. LAURENT, Secretary, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, Assistant Secretary, International Telephone and Radio Manufacturing Corporation, 67 Broad Street, New York N.Y.

1922

Not much this month.

Reunion. The consensus of those consulted thus far is that a reunion modified to meet altered conditions should be held. Details are now being worked out by the committee and officers. Watch for further information in the next issue of *The Review*.

Progress. Crawford Hallock Greenewalt was elected to the board of directors of E. I. du Pont de Nemours and Company on January 19. Greenewalt has been with Du Pont since 1922, when he joined the company as a research chemist. An official

release states: "He is a chemical engineer of proved ability, and he has had an important part in the development of Nylon. At present he is assistant director of the experimental station of the chemical department."

Death. Emery Edgar DeBack died very suddenly of a heart attack in Corpus Christi, Texas. Richard Davy '27, to whom we are indebted for this information, says of DeBack, "The loss of his experience and knowledge in his profession is felt no less keenly than is the loss of his personality by his many friends and associates in Corpus Christi." Our sympathy is extended to DeBack's family.

Your Secretary will welcome information about the various war activities of the Class. Almost everyone is doing something, but particulars for inclusion in the notes are requested. — CLAYTON D. GROVER, Secretary, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. C. YARDLEY CHITTICK, Assistant Secretary, 77 Franklin Street, Boston, Mass.

1923

Jack Keck contributed a clipping from the New York *Herald Tribune* which announced the election on December 20, of Per K. Frolich as president of the American Chemical Society for 1943. Dr. Frolich is director of the chemical division of the Esso laboratories of the Standard Oil Development Company, in Elizabeth, N.J., and is noted as an early experimenter in the butyl rubber process for the manufacture of synthetic rubber. So if we get some synthetic rubber for our automobile tires, perhaps we ought to keep in mind that Dr. Frolich is one of those whom we shall have to thank for it.

As a reporter, the least your Secretary might do is keep up with local news, yet I'm late in reporting an important event in the Fred Mann family. Fred lives right here in Braintree and works for the telephone company in Boston. On October 21 Fred became the father of twin girls. He now has three girls in the family, an older daughter being seven years old.

The engagement was announced in December of Phyllis Barnes, a member of the Junior League of Brooklyn, to William Peckham Pashley who works for Benjamin Moore and Company, New York City. — HORATIO L. BOND, Secretary, 457 Washington Street, Braintree, Mass., JOHN M. KECK, Assistant Secretary, 207 Bloomfield Avenue, Bloomfield, N.J.

1924

Herbert Scott, now a Bermuda perfumer, rated a long column in the New York *Post* recently. Apparently his acute sense of smell, which started him on the road to ownership of Lili Perfumes, Inc., also works outside of business hours. To the delight of a New York barkeeper, says the *Post*, Scott was able to identify practically all the ingredients of a new concoction. He was aided, according to the report, by his sense of taste.

Walter Thee, now a lieutenant colonel and commanding officer of the Quartermaster Motor Maintenance District at

Fort Bragg, has recently patented the first blackout lamp approved by the War Department for use on military motor vehicles. It is now in production in five plants. — Bill Sturdy, a major in the office of the chief signal officer in Washington, was married in December to Jane Oliver Hewitt, formerly of Wellesley Hills.

From Bill Correale we hear that Malcolm MacNaught has been promoted from sales manager to manager of one of the McGraw-Hill publications, *Electrical Contracting*. Bill, who continues to be "acting" as well as "deputy" commissioner for New York's Department of Water Supply, Gas, and Electricity, has recently been appointed an honorary secretary of the Institute by Dr. Compton. Congratulations, Bill. — FRANCIS A. BARRETT, General Secretary, 50 Oliver Street, Boston, Mass.

1925

Just a line to let you know that we are still in there swinging! What with civilian defense activities and the direct war effort, little time is available for extensive correspondence. Yet this very stepping up of the tempo brings out some news items which might not otherwise come to light. Typical of these is a report received of the appointment of Julien J. Edgerly as a lieutenant in the Naval Reserve. He has been working for a number of years as a sound engineer, giving special attention to theatrical problems. His duties with the Navy will be as a radio physicist, for which his experience in applied electronics in the theater business well qualifies him. He has been working in the general area of southern Massachusetts and Rhode Island, his home being in Swansea, Mass. He will be stationed in Boston and may be reached through the headquarters of the First Naval District, 150 Causeway Street, Boston, Mass.

Hank Cunningham dropped in to see me recently. He said that he was still engaged in real estate but that business was not very active at present. He had two or three news items, one of which concerned Tom Killian. Tom is also a lieutenant in the Naval Reserve. He has taken a special ten-week course at M.I.T. and is now at the graduate school of the United States Naval Academy at Annapolis. Up to the time of going on active duty, he was technical director of the Frink Corporation of Long Island City, N.Y.

Hank had also heard recently from Charlie Giblin, IX-B. Charlie has been with the Cities Service Oil Company for a number of years. At present he is located at Newark, N.J., having previously been stationed at Pittsburgh and Harrisburg, Pa., as division manager. — Hank has also heard from Frank McGinnis but had no more recent information than was reported in this section.

Let me take a few lines to make an important suggestion. Many of us are, of course, in national defense work, either in the active services or in production. For those of us who are not so connected, however, I suggest that we could be

1925 *Continued*

tremendously helpful to the local civilian defense authorities if we were to contribute time and effort as air-raid wardens or in similar work in which technical training is of great value. Many of our cities and towns are having trouble completing their staffs, and the addition of a number of technically trained volunteers will greatly simplify their problem. Look into the matter at once and do everything you can to help. — HOLLIS F. WARE, *General Secretary*, 3 Aquavia Road, Medford, Mass. F. LEROY FOSTER, *Assistant Secretary*, Room 7-121, M.I.T., Cambridge, Mass.

1926

On December 8, LeBaron Carleton Colt was married to Elizabeth Vann at Durham, N.C. — Arthur F. Johnson has joined the staff of the Reynolds Metals Company and will be connected with the smelting division of the aluminum plant in Alabama. He was formerly in charge of the development program of the Silver Lake Mine in Silverton, Colo., going there from West Australia where he was employed by the American Smelting and Refining Company.

M. Bernard Morgan visited the Institute in January in search of men to be employed by his company. He is chief plant engineer of the American Viscose Corporation at Meadville, Pa. — Elton Staples was also in town from Chicago during January, having been called here by the illness of his father.

Wilmont A. Danielson, General in the United States Army, has been given command of the general depot at Memphis, Tenn., after completion of his tour of service in the Panama Canal department, where he was constructing quartermaster. — Edward J. McGrew, Jr., is now Major McGrew of the United States Army. — Shih Ming Chu, a major general in the Chinese Army, is now stationed in Washington. — Rockwell Smith has moved from Chicago to Atlanta, Ga., where he may be reached at 401 Hurt Building. — Malcolm S. Hird is now with the American Cyanamid Company, plastics division, Wallingford, Conn. — JAMES R. KILLIAN, JR., *General Secretary*, Room 3-208, M.I.T., Cambridge, Mass.

1927

Your Assistant Secretary today takes up his pen for the first time. After having sat on the side lines and watched Ray Hibbert perform with great ability, if infrequently, I am now called upon to produce this month's notes. Ray, it seems, is so busy turning out aircraft nuts and generally being an important cog in this country's war efforts that he cannot spare the time for his usual cheery word to the Class.

Our fifteenth reunion, as we all no doubt are aware, is scheduled for this spring. The reunion committee this year consists of Joe Burley, Ray Leonard, Jim Lyles, Bill Taggart, and Bob Wise. Additional names will be added as progress is made. By the time these notes are in print, each member of the Class will have received a card asking whether the re-

union should be held this year or postponed until after the end of the war. We all hope that the returns will be prompt and in quantity, so that the committee can base their decision on a good cross section of the Class. If a sufficiently large group are in favor of having the reunion this year, we shall have it. The festivities will probably be held the first or second week end in June, and, at the moment, it looks as though the location would be the Castle Inn at Saybrook, Conn., where the tenth reunion took place so successfully. These ideas, of course, are subject to change as the questionnaires are received and as the details are worked out. Full information can be obtained by anyone who is interested, however, by inquiring of Jim Lyles at the First Boston Corporation, 100 Broadway, New York, or of Bill Taggart at the Dewey and Almy Chemical Company, Cambridge, or of your Secretaries.

If a reunion is held, Bob Wise will again be in charge of the entertainment, and he promises to do as well as last time, *if not better*. The next issue of *The Review* will either announce the postponing of the reunion for another year or two or give the full details as to when and where our fifteenth is to be held, its cost, and so on. — RAYMOND F. HIBBERT, *General Secretary*, Boots Aircraft Nut Corporation, New Canaan, Conn.; DWIGHT C. ARNOLD, *Assistant Secretary*, Arnold-Copeland Company, Inc., 222 Summer Street, Boston, Mass.

1932

After exchanging several letters with your Secretary, Don Gilman has sent this notice regarding our tenth reunion: "Since the events at Pearl Harbor, all tentative plans for a big class reunion in Boston have been set aside. None of us would be in a frame of mind for such a celebration, and very few of us would want to sacrifice the time or make any advance commitments as to where we might be and what we might be doing on June 1.

"Our memories of the Institute and our classmates are getting a little on the mellow side, however, and we might derive a great deal of pleasure from having a reunion by mail. After ten years, we are all beginning to wonder what has become of our old friends, what they are doing, what they look like, and how many kids they have. I know we have asked all the boys to write letters before, and I know how hard it is to sit down and actually write that letter; but *this* is different. These letters have got to take the place of our class reunion. Let's look at it this way: If we were to get a phone call all of a sudden from Bill Kirkpatrick or Johnny Lawrence or Bill Holst or some other classmate, we should drop everything and rush downtown and spend the evening talking over old times with him. So if we *now* spend just 15 or 20 minutes scribbling a note for the June issue of *The Review* — telling all about ourselves, what we are doing now, and what we have been doing for the past ten years — then we can all spend a mighty

interesting evening in June swapping these stories."

These notes take on increased importance now that we find it impracticable to hold our tenth reunion this June. As Don suggests, through this medium we can all contribute to keeping our Class together as an effective unit of Alumni.

From the headquarters of the First Naval District we have a notice that Earl Longfellow was sworn in as a lieutenant, junior grade, in the United States Naval Reserve on December 15. Previous to joining the Reserve, he was employed as a sales engineer with the Chicago Metal Hose Corporation, Maywood, Ill. — Fred Henderson became engaged in December to Audrey Elizabeth Smith of Cambridge, Mass. Miss Smith is a graduate of Lasell Junior College. Fred is now assistant to the dean of engineering at Northeastern University. Plans are being made for an April wedding.

Buck Buckley writes us from 659 Laurel Avenue, Bridgeport, Conn.: "I have been here about a year and a half now, working at the Bridgeport Brass Company with the title of finishing supervisor. With priorities the way they are, I doubt if we shall have anything to finish in a short while, but so far I have been kept fairly busy. The brass company has gone all out for defense and recently celebrated the turning out of the 25,000,000th cartridge case. These shells range in size from 20 millimeters, which are about six inches long, to the navy five-inch shell about a yard long. At the celebration, a representative of Secretary Knox presented the officials of the company with the coveted navy 'E' for excellence in production. Ours is the first company in New England to achieve this reward, and now we all proudly wear a button with a navy 'E' on it.

"So much for the job. As far as personal items are concerned, I haven't much to offer. As you know, I have been married now for three years and am the proud daddy of Suzanne, who is fourteen months old. Last June, Grace and I went to Boston to Bill Walsh's wedding. John Brown was also there. John isn't (or wasn't) married, but he appeared quite interested in one of the fair guests at the wedding. We received Christmas cards from Don, Doris, and Hugh Gilman from Elmhurst, Ill.; and from Dennis, Pauline, and Dennis Curtin, Jr., from Canfield, Ohio.

"While looking for an address in Fairfield a couple of months ago I stopped to ask directions from a fellow who turned out to be George Sistare from New Bedford, Mass. He was working at the Handy and Harmon company and said he enjoyed it very much. He promised to give me a ring and come over and spend the evening with us some time."

From 5242 42d Street, Northwest, Washington, D.C., we hear the following from Fred Moss: "Washington is certainly a busy place these days and is full of Tech men. The Washington Society of the M.I.T., which is quite active (from 40 to 70 Alumni turn out for our monthly meetings), had 150 present for a meeting devoted to Technology in defense. The

1932 Continued

only news of our Class is that John Robertson left town on October 1. He gave up his job with the National Lime Association to take a better one in Chicago with the United States Gypsum Company. His new home address is 1034 Maigret Avenue, Des Plaines, Ill. When he took himself, his wife, and two cute kids away, we experienced a distinct loss. Private architecture reached the vanishing place when we entered the war, so I moved over and became an engineer. I'm with the Roberts and Schaefer Company of Washington and Chicago, designing concrete airplane hangars and army depots. I've been married for five years to a girl I met in Fontainebleau when I was there on an M.I.T. scholarship. We have a 20-month-old daughter."

Al Dunning says: "I'm still working for Monsanto Chemical Company, but I'm at present in the plastics division in Springfield, Mass., having left the Merrimac division in Everett, Mass. I'm pretty much out of active flying now, after surviving six serious fires, forced landings, and crashes. I have charge of the aviation development — mostly working on transparent window materials and linings of self-sealing bullet-proof gas tanks. Plenty of hard work and travel."

Bob McGilvra writes from 1028 West Clay Street, Lancaster, Pa.: "No special story in my change of address. I became assistant project manager for Brann and Stuart Company, contractors on the Marietta regulating depot, and, since January 1, project manager. We turned the first warehouse over in 86 days, a record time, and finished one each week thereafter. We are now starting a naval supply depot at Mechanicsburg, Pa."

Phil Mayo writes: "I am with Spencer Lens Company (microscopes and optical instruments), sales division. Previous to coming to Buffalo about a year ago, I was doing similar work with E. Leitz, Inc., working out of Detroit. I've been interested in reading class notes, but I'm afraid most of the boys have been as negligent as I in keeping you posted." — CLARENCE M. CHASE, JR., *General Secretary*, 1207 West 7th Street, Plainfield, N.J. CARROLL L. WILSON, *Assistant Secretary*, Research Corporation, 137 Newbury Street, Boston, Mass.

1934

We owe an orchid and a vote of thanks to Bob Roulston for the fine job he did in compiling the class directory. As a matter of fact, his work is so complete that the mere mention in the notes of the whereabouts and vocations of our class members will be repetitious for some time to come. Certainly the directory answers a great many questions that wander occasionally through our minds. What became of Bill after he left the Filmore Corporation? Did he finally marry that blonde, Ruth Whatsername, whom he was courting so persistently? The directory discloses that he is now vice-president of the Wilton Company, and not only did he marry Ruth but he now has Bill, Jr., aged three, and Mary, aged four months.

Leafing through the book sure brings back memories and produces considerable amazement.

Brad Ellenwood has contributed a letter on his *status quo*: "Some time has elapsed since both The Review and I have been able to catch up with each other. This coincidence can be directly charged to defense which is even trying to make a Hoosier out of an old salted Boston cod like me. I have left the Austin Company, engineers and builders, and am now resident engineer for the Lukas-Harold Corporation, designers and operators of the new Naval Ordnance Plant in Indianapolis. The latter is a project now estimated to cost upwards of \$12,000,000. The plant is in the process of construction, and — by another strange coincidence — the work is being done by the Austin Company. I am slated to take over as supervisor of maintenance when we move in. But — by golly — the East is God's country. Other XVII men will be interested to hear that I had a swell hour's chat with Sam Crew in Cincinnati in August. Boy! does he look good and so did that long low convertible." Thanks Brad. We shall be looking forward to hearing from you again.

Last December a news item appeared in one of the Boston papers showing the smiling countenance of Roger Williams. The article read: "Capt. Roger H. Williams, engineer officer of Natick, Mass., had the honor of being one of the first United States Army men to set foot on Dutch Guinea soil when the United States force, guarding the bauxite mines in the South American colony, established their headquarters in Paramaribo, according to an announcement made in Washington by the War Department."

Keep an eye on the bauxite, Roger. We don't want to contribute any more aluminum pots and pans, or we shall have to squat over a fire and barbecue our food on sticks!

Wilbert Frantz was married on December 24 to Anne Sharples of Peterborough, N.H. Mrs. Franz was graduated from Radcliffe in '33 and is a member of the American Alpine Club and the women's ski team of the Appalachian Mountain Club. Congratulations Will, and we hope you can keep up with her.

With the defense program in full swing, nobody has a great deal of time to spare; but you will all agree that it doesn't take much time to write the amount that can be crammed onto a penny post card. That much news about what you are doing will be well appreciated. So during the next week, take time out — during noon hour or while you are waiting for the good wife to prepare dinner — and scratch off that much news. — JOHN G. CALLAN, JR., *General Secretary*, 184 Ames Street, Sharon, Mass. ROBERT C. BECKER, *Assistant Secretary*, Chile Copper Company, Chuquicamata, Chile, S.A.

1935

One item of considerable importance is noted in this issue of the class notes. The Alumni Fund campaign for last year is over, and you have all seen the results as

published. The standing of '35 was fair in comparison with that of others, but a comparison with other classes is not the point I wish to get across. The nation is engaged in the very serious business of war. In the promotion of national defense the Institute is playing a very important part. As you are aware, science is ever more vital in such matters. Let's all get together and help make it possible for the Institute to do an even better job on national defense. The next time you are asked to contribute to the M.I.T. Alumni Fund, remember — your contribution is for your own safety as developed by the Institute.

And now, kind friends and patient readers (I hope), I have a swan song to sing. The combination of a somewhat transient existence and the pressure of very long hours of work has become too much for your Secretary to do justice to the office. Consequently, this is the last issue of the notes to come from his pen. From here on Walt Stockmayer and Dick Lawrence will take over. So long. — ROBERT J. GRANBERG, *Retiring Secretary*, care of W. C. Voss, 9 Old Town Road, Wellesley Farms, Mass. WALTER H. STOCKMAYER, *General Secretary*, Columbia University, Department of Chemistry, New York, N.Y. RICHARD LAWRENCE, *Assistant Secretary*, 111 Waban Hill Road, North, Chestnut Hill, Mass.

1938

Announcement has reached us of the marriage of Stanley Ginsburg to Elinor Weiss on January 15 in Brookline. — John Michel, who was with us for two years, was recently married in Puerto Rico. The bride, Lucille Greene of Bronxville, attended Sweet Briar and Barnard colleges. The ceremony was performed in El Morro Chapel, San Juan, and a reception followed at the Officers' Club. John is a lieutenant with the 27th Engineers, United States Army, stationed at Camp Buchanan. He was graduated from West Point last June.

We have the story on the Bruneau-Biza wedding also. On December 6 in Glen Rock, N.J., Lou and Muriel took the vows, received friends at a wedding breakfast, and were off on a southern trip. They are back in Brooklyn now, at 148 Willow Street, and are quite settled down. — Cliff Nelson, VI-A, who is now in Washington as a research fellow in the United States Public Health Service, was married on October 6 to Jane Veazie of Belmont and Simmons College.

In Chicago on November 22 Bill Burrall, VI-C, was married to Marjorie Sherman, a graduate of Northwestern University. — The engagement of Katharine Scott to Chauncey Bell, XVI, was announced recently in Huntington, Long Island. We have also heard of the recent engagement of Janet Ray to Fred Forman, I, who is now attached to the 35th Corps of Engineers at Camp Robinson, Ark.

Your Secretary accepted the kind invitation of the Technology Club of New York to all members of '38, '39 '40, and '41 to attend a meeting early in December. As you have probably read elsewhere

1938 Continued

in this issue, the party was a big success and everyone enjoyed the beer and sandwiches. Johnny White, VI, was there, and he informed us that he was with the Pennsylvania Railroad in New York but expected to be transferred any day. We also chatted with Art Christgau, X, who said he was located in the New York office of the West Virginia Pulp and Paper Company. Art is now a boiler-water expert in their power department. Frank Dowding, in the design department of the Texas Company, dined with us and went to the alumni party. Lou Bruneau was also on hand at the smoker.

Those who attended the chemical exposition at Grand Central Palace probably saw Lewis Hull, X, who was chief barker for the American Defibrator, Inc., exhibit. He was demonstrating a very neat machine. — Andy Stergion is in the analytical section of the arms and munitions division at the Aberdeen Proving Ground, Md. Why don't you drop in on some of the old gang when you're up in Boston, Andy? She doesn't keep you busy all the time, does she?

Fred Viles has recently been commissioned ensign, United States Naval Reserve. Fred has been with Liberty Mutual Insurance Company in Boston working on chemical and industrial hygiene and will perform medical corps duties with the Navy. — Both of your Secretaries managed to get together in New Rochelle on New Year's Eve with Frank Gardner, Ira Lohman, and Jim Gillis '40. (When are you going to get that changed to '38, Gilder?) Ira has a new position with Sperry Gyroscope Company in Brooklyn. Frank is in the hills of New Jersey with American Brake Shoe and Foundry Company — and that ain't all. — DALE F. MORGAN, *General Secretary*, 142 Woodland Avenue, New Rochelle, N.Y. RICHARD MUTHER, *Assistant Secretary*, Room 1-180, M.I.T., Cambridge, Mass.

1939

From Charles E. Locke '96, Alumni Secretary, we learn that Eugene M. Thomas, XIX, who received his S.M. in '39, has been appointed acting chairman of the division of engineering at the Texas College of Mines and Metallurgy. Thomas, who is associate professor of mining and metallurgy, replaces John W. Kidd, dean of that division, who died recently. — STUART PAIGE, *General Secretary*, Box 207, Greenwich, Conn. ROBERT C. CASSELMAN, *Assistant Secretary*, 271 Cypress Street, Newton Centre, Mass.

1940

By a strange coincidence I have been told in a letter from Bob Hess that his overcoat actually did arrive on Christmas Eve (see the December Review). From Charley DeMaily came a letter saying that he had completed a year with the Harbor Defense Ordnance and had returned to civilian status. The DeMaily's became proud parents on October 24 upon the arrival of a baby girl. Congratulations to you both. Dave Morgenthaler has reported for active duty at near-by Langley

Field, but as yet I've been unable to contact him other than in one short telephone conversation. — Bonner Hoffmann wrote that he changed from Montgomery Ward and Company to the United States Rubber Company. He says at Ward's his work was mostly personnel, and the personnel were mostly young girls. I know it sounds queer, but he did change to United States Rubber Company. — Larry Benenson has his own office and is doing alterations and remodeling in New York. — Jim Boulger has recently finished a California-style home and is starting construction on another modern house. Edward J. Kingsbury, Jr., and Mrs. Kingsbury are building their own home and, according to Mrs. Kingsbury, it is now progressing beautifully despite a slow start.

Bill Schnorr sent an interesting letter about the climate in Maine and his work with the S. D. Warren Paper Company. Bill writes, "The terminology, 'going through the mill,' certainly applies to the course, as one is given every opportunity to follow the paper manufacturing industry — from wood piles to the shipping department. At present, eight Technology men are active in the company, going back as far as the Class of '92, so you see we have the foundation for a 'Little Technology' in papermaking." Bill also says he loves the fishing, skiing, and hunting up there in those woods.

Joe Jefferts, a lieutenant, wrote a letter which will be of interest to many of you. Joe writes: "During maneuvers we had our headquarters in Shreveport, La. One Sunday morning I picked up the newspaper and there, staring out at me, was a picture of John Vanderpoel, a lieutenant in the Air Corps, and his brand-new bride. He had just been graduated from Barksdale Field. As he had left on his honeymoon, I was unable to contact him. Also while on maneuvers I saw Bill Taylor. Bill Stern is in the Army somewhere in Massachusetts and Dick Gerages is working in my home town, lucky guy!"

Joe Wiley and Karla Hummel were married on October 31. Byron W. Wheeler, Jr., and Juliaette Barradale were married on November 23. Fred P. Lobban and Frances E. Conrad were married on November 8. Margaret Dienes is now Mrs. George J. Dienes. Samuel P. Card was married to Henrietta Renshaw on the 26th of December.

I ran into Schrade Radtke one evening just before the launching of the U.S.S. *Indiana*. He was with Karl D. Fernstrom '10. Schrade is now a staff supervisor for Professor Fernstrom at the North Carolina Shipbuilding Company. He says it's been a great experience watching K. D. put into practice the stuff he taught at school. Every once in a while K. D. lectures the rest of the executives and superintendents in the department-head meetings, and it seems like old times in 15.70 watching the boss give the boys the once-over, so says Radtke.

Recently I have gone through my files and listed the names of all those men who are engaged with the United States Army, Navy, or Marines. Please realize

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before reading through this list that my files may be somewhat out of date or behind times, and also that unless some notice has been sent into The Review concerning changes, we have no accurate means of keeping track of new addresses. No doubt with the rapid change of men from post to post this list will fail in some respects. Still I believe it will be of some benefit to those who have requested this information.

ABERDEEN PROVING GROUND, MD. — Capt. P. P. Bernd, Lt. P. V. Bollerman, Capt. P. H. Brown, Lt. F. G. Crabb, Capt. A. W. Manlove. FORT ADAMS, R.I. — Lt. L. W. Helmreich. PENNSYLVANIA SHIPYARDS, INC., BEAUMONT, TEXAS. — Ensign R. Colie. FORT BENNING, GA. — Capt. J. L. Cowhey, Lt. D. E. Swift. FORT BELVOIR, VA. — Capt. W. E. Leonhard. CAMP BLANDING, FLA. — Lt. H. K. Sedgwick. FORT BLISS, TEXAS. — Lt. R. G. Fife. FORT BRAGG, N.C. — Capt. J. W. Chapman, Lt. D. M. Cole, Major E. S. Mathews, Lt. J. A. Morrison, Pvt. J. I. Hoke. NAVY YARD, BROOKLYN, N.Y. — Lt. L. L. Schock. CANAL ZONE — Lt. O. J. Earle, Capt. J. L. Cohn, Capt. J. S. Luckett. CHANUTE FIELD, ILL. — Aviation Cadet S. N. Tower. NAVY YARD, CHARLESTON, S.C. — Lt. B. G. Wade. OFFICE ZONE CONSTRUCTING QUARTERMASTER, CHICAGO, ILL. — Lt. J. J. Piotti. NAVAL AIR STATION, CORPUS CHRISTI, TEXAS — Ensign L. P. Eisman. FORT DEVENS, MASS. — Lt. S. Rabinowitz. FORT DIX, N.J. — Pvt. R. H. Stocker. FORT DU PONT, DEL. — Capt. J. G. Schermerhorn. CAMP EDWARDS, MASS. — Capt. S. W. Connelly, Lt. K. T. Jackson. FORT FOSTER, MAINE — Lt. B. L. Newcomb. GUNTER FIELD, ALA. — Lt. P. M. Butman. FORT HANCOCK, N.J. — Lt. L. Michelson. CAMP HULEN, TEXAS — Capt. E. N. Kirsten. AIR CORPS TRAINING DETACHMENT, JACKSON, MISS. — Aviation Cadet W. W. Pomeroy. FORT JAY, N.Y. — Lt. G. W. Morton. JEFFERSON BARRACKS, MO. — Lt. R. S. Nedell. FORT PHILLIP KEARNEY, R.I. — Lt. W. R. Stern. FORT KNOX, KY. — Pvt. A. E. Castle, Lt. W. R. Taylor. LANGLEY FIELD, VA. — Capt. A. P. Little, Lt. D. T. Morgenthaler. UNITED STATES AIR BASE, NEW ORLEANS, LA. — Ensign I. H. Chase. NAVY YARD, MARE ISLAND, CALIF. — Lt. J. H. McQuilkin. MACDONALD FIELD, FLA. — Capt. D. B. Parker. MITCHEL FIELD, N.Y. — Lt. G. R. Smith. FORT MONMOUTH, N.J. — Lt. J. L. Joseph, Lt. R. S. Mabey. FORT MONROE, VA. — Capt. S. C. Russell, Lt. O. K. Smith. MURK BOMBING FIELD, CALIF. — Lt. Jay Zeamer. PINE CAMP, N.Y. — Lt. F. P. Lobban. CAMP POLK, LA. — Lt. E. L. Bernard, Lt. L. G. Goldberg. PUGET SOUND NAVY YARD, WASH. — Lt. J. J. Fee. QUANTICO, VA. — Pvt. M. R. Erickson. RANDOLPH FIELD, TEXAS. — Lt. J. F. Thompson. RARITAN ARSENAL, N.J. — Lt. E. G. Brush. SPRINGFIELD ARMORY, MASS. — Lt. M. P. Bearce. TULSA, OKLA. — Lt. N. R. Klivans, Capt. R. F. Seedlock. VANCOUVER BARRACKS, WASH. — Lt. D. P. Spalding. UNITED STATES COAST GUARD, WASHINGTON, D.C. — Lt. P. V. Colmar. WATERTOWN ARSENAL, MASS. — Lt. A. V.

1940 Continued

Dishman, Lt. C. H. Wood. BAER FIELD, IND. — Lt. J. O. Crum. FORT WETHERILL, R.I. — Lt. F. B. Stern. WINDSOR LOCKS, CONN. — Lt. P. W. Witherell. FORT H. G. WRIGHT, N.Y. — Lt. P. A. Stoddard. WRIGHT FIELD, OHIO — Capt. A. R. Maxwell, Lt. W. J. Van Sciver. CHEMICAL WARFARE SERVICE DEVELOPMENT LABORATORY, M.I.T. — Capt. J. H. Rothschild. PUERTO RICO — Lt. G. W. Carnrick, Capt. C. W. Cecil, Capt. O. G. Haywood, Lt. R. E. MacPhaul, Capt. E. D. Mohlere. DEPARTMENTS AT WASHINGTON, D.C. — NAVY — Lt. C. T. Booth, Lt. E. S. Carmick, Lt. H. B. Dodge, Lt. J. E. Dodson, Lt. T. J. Greene, Lt. E. B. Hooper, Ensign L. C. McEwen, Lt. A. B. Metsger, Lt. L. M. Mustin, Lt. H. Rivero, Lt. A. G. Ward. — WAR — Lt. W. Menoher, Lt. G. L. Evans, Capt. M. L. DeGuire. ABOARD SHIP — U.S.S. *Dixie*, Lt. Edward M. Day, U.S.S. *Wasp*, Ensign Val deOlloqui, Lt. P. R. Lackner, U.S.S. *Madison*, Lt. W. M. Foster, U.S.S. *Belknap*, Ensign R. S. Hess, U.S.S. *Hopkins*, Ensign A. T. Higgins, U.S.S. *Saratoga*, Lt. G. F. Kosco, U.S.S. *Spencer*, Lt. Comdr. G. M. Phannemiller, U.S.S. *Niblack*, Lt. G. C. Seay.

Men who have service ranks but whose present addresses don't indicate place of duty or even if they are at present on the active list follow: Pvt. J. H. Baird, Ensign J. Braun, Lt. J. S. Brierley, Lt. H. A. Burr, Lt. D. B. Churchill, Lt. W. L. Clark, Lt. A. F. Collazo, Lt. E. O. Davis, Lt. C. V. F. de Mailly, Lt. J. R. V. Dickson, Lt. J. O. F. Dorsett, Lt. D. L. Eckhardt, Lt. R. J. Esslinger, Capt. G. J. Forney, Major M. I. Gabel, Lt. J. Graham, Lt. C. V. Hawk, Ensign R. E. Herr, Pvt. W. S. Kather, Lt. W. W. Keller, Sgt. J. K. Knight, Capt. O. G. Kreiser, Lt. N. T. Kridel, Flying Cadet F. L. Lewis, Lt. W. F. Meany, Ensign R. C. Morehouse, Ensign P. C. Morgan, Jr., Lt. D. L. Mowrer, Flying Cadet L. W. Nash, Lt. W. G. Osmun, Lt. R. H. Pearson, Lt. W. P. Ready, Lt. J. R. Z. Reynolds, Lt. E. G. Robbins, Lt. G. R. Stone, and Lt. J. A. Vanderpoel. — H. GARRETT WRIGHT, *General Secretary*, 44 Main Street, Hilton Village, Va. THOMAS F. CREAMER, *Assistant Secretary*, Room 3-208, M.I.T. Cambridge, Mass.

1941

In the Quartermaster Corps we are all leaving our specialized jobs at the various depots and are going into the field for active duty with the troops. Many of the members of our Class are finding the same condition in other services. Rog Finch, Boris Miller, Mert Richardson, and yours truly are either at Camp Lee, Va., or headed there.

Kemp Atwater, who was with us for a couple of years before transferring to Brown University, is stationed at Randolph Field, Texas. Steve Kinney is an ensign at the Naval Air Station, Alameda, Calif. Sterling Ivison is an ensign at the Naval Air Station at Quonset Point, R.I., where he has the job of matériel officer along with the extracurricular activity of being treasurer of the bachelor officers' quarters. Ivy tells us something

we had been worried about for some time: "Willie Compton, also an ensign, came through the Pearl Harbor raid without injury."

Gene Crawford, an ensign at the Naval Air Station at Alameda, forwards a letter full of information: "Dave Jacobson is working in Upper Darby, Pa., doing defense housing work for the Farm Security Administration. He rants about '\$3,000,000 worth of building in the next three years.' He seemed to feel pretty safe from the draft. — Up to a short time ago, Bill Schubert was one of those fortunate people taking a course in aircraft engines at the Institute.

"Dick Gould seemed to be heading for Navy V-7 in January. He was working for American Airlines, Inc., and wrote, 'Be seeing you before long.' — Carlos Arguelles' recall to the Philippine Army was countermanded to allow him to return to M.I.T. on a scholarship. At the same time, he is detailed to survey and study army camps. This survey will serve as his master's thesis. He is also taking an active part in the publication of a new architectural magazine called *Task*. — Anatole Kopp is back at Tech for one year. He announces the birth of a daughter, Helene.

"Henry Auerbach wrote: 'Both Martha Howe and I have been working at city planning since June. I began in Wellesley but am now with the Boston City Planning Board. Martha has been doing town planning for Canton, Mass., and more recently for the Brookline Planning Board. Second-degree flat feet kept me out of the Army last spring, but I have a feeling that my commission will be accepted any day now.'

"Warren Sargent wrote: 'I was married on June 29. Through the mediation of Edward M. Bridge '13, Assistant Professor of Architecture at the Institute, I started in June as assistant to H. J. Korslund, an architect in Norwood. Having an Axis to grind presents an unhappy future for the poor architect.'

"Lawrence Reeve announced the birth of a daughter, Cassandra, along about Bunker Hill Day. He said, 'The E. G. Budd Manufacturing Company of Philadelphia has offered me a job and suggested that I first study aeronautical engineering at M.I.T. I shall be at the Institute for one term and then migrate back to Philadelphia in June to build wings and so forth.

"'Even to think about the calculus I never knew is almost worse than thinking about the Japanese.' — After working during the summer, Bill DuBois came back to Tech for another year. He has found none of the leisure that we all thought was part of the grad year. Bill has no entanglements as yet, feminine or military, and no definite plans for the future.

"John Cutler is back at the Institute. John Manget is in Georgia working on civilian defense architecture. Phyllis Winter is working for a private architectural firm in Boston and is undoubtedly winding bandages or driving a streetcar on the side. The last I heard, Charlie

Muller was in Texas with the Army. Norton Polivnick and Myron Phillips, I'm sorry to say, have escaped my Gestapo completely. — That will hold us for another six months, Gene; thanks.

Most of this column was written when your Secretary was officer of the day, and many of the letters received have the same background. Bill Butt sends an epistle full of news from the O.D. quarters at Wright Field, Dayton, Ohio: "Mel Biggs, formerly with the American Bridge Company, Elmira Heights, N.Y., is now with the Curtiss-Wright Corporation in Buffalo. He stayed in Elmira long enough to have his engagement to a local girl announced.

"Jim Mar, the inimitable, is still with Curtiss in Buffalo. He is being married on February 28 in Rochester, N.Y., to Edith Lew. — Course I has quite a contingent in Panama, all working on the third set of locks. Classmates in Panama are Mike Driscoll, John Macleod, Bill Sheard, and Bob Taylor.

"Yours truly and Milt Abel are doing their bit at Wright Field. Milt is in the matériel division, and I work in the propeller laboratory. We both really enjoy the work. In the January Review you mentioned the names of a few Tech boys at the field. The place is so crowded with them that the C. O. is unofficially contemplating changing the name to the M.I.T.ériel division.

"I've heard that Johnny Brannan is in the Army somewhere. I sure wish he'd write to Wright Field. The same wish goes for the rest of those not accounted for, namely: Jay Jerome, Dick Markey, Oscar Mapua, Bob Smith, and Stan Van Greenby. — Gladys Thompson, fair coed of Course I, is located in the airplane division of the E. G. Budd Manufacturing Company in Philadelphia. Charlie Peck holds down an assistantship in the Department of Civil Engineering at school." Thanks, Bill.

Mart Mann has finally let industry strike out for itself and has joined the Signal Corps. He is now acting as communications officer at the army base in New York. Les Corsa is still at the American Can Company and may do some bacteriological work for defense. Les told us some other news, but we're not sure it's official so won't say a word about it until the story is verified. Your Secretary recently got a letter from Will Mott, '41 Prexy, who is doing fine in Chicago. Officially engaged is Bob Alfred to a budding chemist from Simmons, Edith Baum.

Ye press says that Olive Dame Coolidge is engaged to Bob Butman. Both are from West Medford, Mass., Bob is in the radio branch of the Bureau of Ships. Evelyn Shaw is engaged to Art Stevens; Cora May Farrier to Howard Wade, now an ensign at the Naval Air Station in Miami; and Dorothy A. Sturm to Bill Kussmaul, now at the Aberdeen Proving Ground, Md. — STANLEY BACKER, *General Secretary*, 46 Bicknell Street, Dorchester, Mass. WILLIAM R. AHRENDT, *Assistant Secretary*, The Graduate House, M.I.T., Cambridge, Mass.

Important Announcement

1942
ALUMNI DAY

will be held in the afternoon and evening of
SATURDAY, APRIL 25

☆ ☆ ☆

Abbreviated program of

TWO EVENTS

Afternoon — Class Day Festivities — Walker Memorial
Evening — Stein-on-the-Table Banquet — Hotel Statler

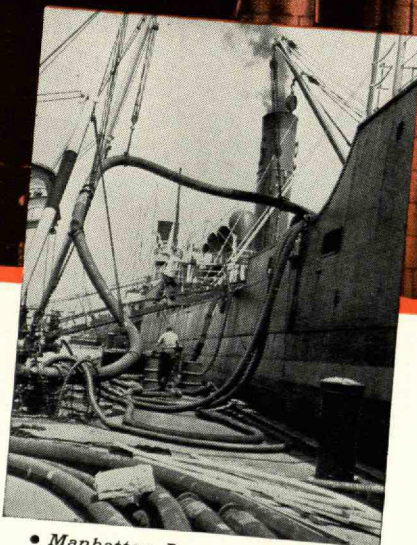
☆ ☆ ☆

*Reserve the date—Saturday, April 25—for your
annual trek "back to Tech."*

From Earth to Air



• Manhattan Rotary Hose, Belts and Brake Lining drilling well in Texas oil field.



• Manhattan Paronite Oil Hose loading tanker at Eastern Port.

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Flat Belting	Stuffing Box Rings
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Refinery Hose	Molded Goods
Fueling Hose	Asbestos Products
Tank Car and Truck Hose	Abrasive Wheels
Fire Hose	Rubber Lined Tanks

Thomas H. Boyd, '23 Charles P. McHugh, '26
Wilder E. Perkins, '25 Daniel J. Hanlon, '37
Albert W. Beucker, '40

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THE MANHATTAN RUBBER MANUFACTURING DIVISION
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MAKING CONDENSERS

DIRECT READING

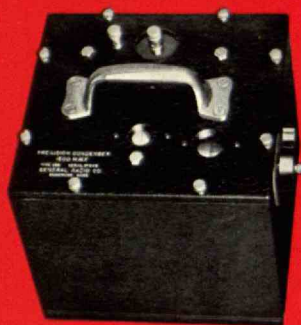


Fig. 1. The Obsolete Type 222-M Condenser

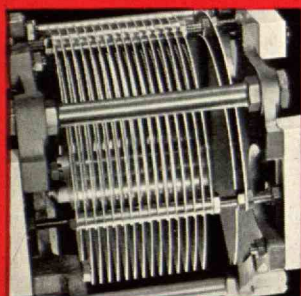


Fig. 2. Adjusting Plates of the Type 222-M

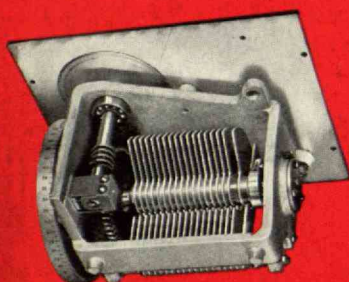


Fig. 3. The Improved Type 722 Condenser

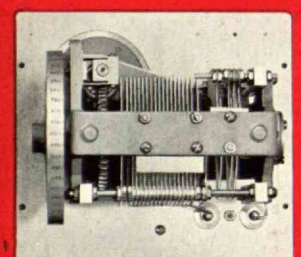


Fig. 4. Dual Sections of the Type 722-D

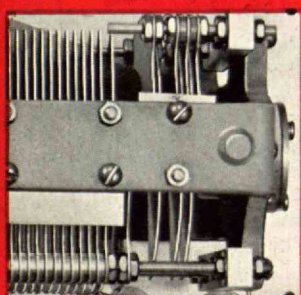


Fig. 5. Special stator plate and low-capacitance section of the Type 722-D Condenser

A VARIABLE AIR CONDENSER with semi-circular rotor and stator plates can be made to have remarkable linearity over about 80 per cent of a half turn. When used with calibration curves or charts, the accuracy obtained is so high that for many years manufacturers were discouraged from attempting to make condensers direct reading.

This phase of condenser development is now over. Most new condensers have direct-reading scales calibrated to an accuracy as good as was formerly obtained with calibration curves.

The first step in making a condenser direct reading was taken with the now obsolete Type 222 (Fig. 1). The worm was cut with double threads giving $12 \frac{1}{2}$ turns for $\frac{1}{2}$ turn of the rotor. The number of plates were adjusted to make the capacitance increment per turn about $100 \mu\mu\text{f}$. Ten turns (or 80 per cent of the available motion) would then correspond to $1,000 \mu\mu\text{f}$.

The scale markings were chosen to indicate capacitance taken out of the circuit. Adjusting plates were provided to make the capacitance per turn exactly $100 \mu\mu\text{f}$ (Fig. 2). Since the stator plates were supported at three points, the stator adjusting plate could be warped to make up for irregularities in the main stack.

With this construction it was possible to adjust the condenser so that it was direct reading in capacitance difference from the zero mark with an accuracy of $1 \mu\mu\text{f}$ or 0.1% , whichever was greater.

The Type 722 Precision Condenser (Fig. 3) was developed as an improvement on the Type 222. Most of the changes . . . ball bearings . . . integral-cut worm . . . cast-aluminum frame . . . worm shaft at right angles to the panel . . . have no immediate bearing on the direct-reading problem.

In the Type 722-D the function of the drum and dial are transposed (Fig. 4). Twenty-five turns of the worm produce a half turn of the rotor plates. The dial is divided into 250 divisions; the usable portion of the condenser then has 5,000 divisions; one $\mu\mu\text{f}$ covers 5 divisions on the $1,000 \mu\mu\text{f}$ condenser.

The stator plate at the right of the stack (Fig. 5) is used to make the capacitance per turn exactly $50 \mu\mu\text{f}$. Since only two stator supports are used, this plate can be tipped to correct for slight irregularities in the main stack. As this plate cannot be warped, a special stator plate, cut out in the middle, is used at the left end of the stack (Fig. 4). This plate increases the capacitance per turn at the ends.

Zero capacitance is altered by bending the flat plate which extends from the frame. By means of these various adjustments the large section of this condenser is made direct reading in total capacitance to $1 \mu\mu\text{f}$ or 0.1% between $100 \mu\mu\text{f}$ and $1,000 \mu\mu\text{f}$. A small section is provided also. This has one-tenth the capacitance of the larger. It is adjusted by similar means to be direct reading in total capacitance to $0.2 \mu\mu\text{f}$ or 0.1% between 25 and $100 \mu\mu\text{f}$.

By appropriately shaping the rotor and stator plates, these precision condensers can be adapted to use in a large number of direct-reading instruments. Plates A (Fig. 6) are standard semi-circular plates; stator B is the compensating plate used to increase the capacitance per turn at the ends of the calibration; stator C is used in the low capacitance stack to decrease zero capacitance. Pair D give a logarithmic scale over a three-to-one range when used in a tuned oscillator; pair E will give a linear scale for frequency, and a semi-logarithmic scale for capacitance. Plates F are used in a beat-frequency oscillator to give a scale covering three decades.

The fundamental mechanical and electrical problems in making condensers direct reading having been solved, it is now possible to design a condenser which can be made direct reading in almost any one of the many related quantities which the condenser may control in a circuit or an instrument.

Fig. 6. Some typical condenser plate shapes

